NOT TO BE ISSUED
OUT OF THE LIBRARY.

BOMBAY BRANCH
OF THE
ROYAL ASIATIC SOCIETY,
TOWN HALL, BOMBAY.

Digitized with financial assistance from the
Government of Maharashtra
on 05 October, 2018

THE

WEST COAST OF HINDOSTAN PILOT,

INCLUDING

THE GULF OF MANAR, THE MALDIVH AND THE LAKADIVH ISLANDS.

104823

COMPILED BY

COMMANDER A. D. TAYLOR, OF H.M. LATE INDIAN NAVY.

PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY.

LONDON:
PRINTED FOR THE HYDROGRAPHIC OFFICE, ADMIRALTY;
AND SOLD BY
J. D. POTTER, *Agent for the Admiralty Charts,*
31 POULTRY AND 11 KING STREET, TOWER HILL.
1866.

4347. *Price Six Shillings.*

God
915.4
Tay/Wes
104823

00104823

ADVERTISEMENT.

THE West Coast of Hindostan Pilot contains Sailing Directions for the Coasts of Sindh, Kutch, and Katiawar, the Gulf of Cambay, and the West side of India, commonly spoken of as the Malabar Coast; also for the West Coast of Ceylon, which is included in the Gulf of Manár; and for the Lakadivh and Maldivh islands. They have been compiled from the following sources:—

The Gulf of Manár is from the printed remarks of Messrs. Twynam and Franklin, R.N., and from Sir Emerson Tennant's "Ceylon."

The West Coast of Hindostan, from Cape Comorin to Karáchi, is from manuscript remarks by officers of the late Indian Navy; southward of Bombay by Commanders A. D. Taylor and R. Williams; Gulf of Cambay by Captains R. Ethersey and C. G. Constable; Katiawár, Kutch, and Sindh by Commanders A. M. Grieve and A. D. Taylor, and Mr. W. A. Fenner, and the late Captain Horsburgh's East India Directory, and Thornton's Gazetteer.

The description of the Maldivhs is taken from the writings of the surveying officers under Captain R. Moresby in the Bombay Geographical Society's Journal.

G. H. R.

Hydrographic Office, Admiralty, London,
January 1866.

CONTENTS.

CHAPTER I.

GENERAL DESCRIPTION OF THE WEST COASTS OF HINDOSTAN AND CEYLON, — CURRENTS. — TIDES. — MONSOONS. — REMARKS ON MAKING PASSAGES.

	Page
Hindostan and Ceylon, West coast	1–5
Currents. Tides	6–8
Winds. Cyclones. Land and sea breezes	9–14
Monsoons	15–24
Rain-fall. Climate. Variation of compass	25–27
On making passages	28–34

CHAPTER II.

GULF OF MANÁR.—POINT-DE-GALLE TO CAPE COMORIN.

Coasts of Ceylon, Mádura, and Tinavelly	35–37
Pearl banks	38
Point-de-Galle to Colombo	39–50
Colombo. Manár. Adams bridge. Ramiseram island	51–59
Paumben pass to Tuticorin	60–63
Tuticorin. Manápaud point. Cape Comorin	64–71

CHAPTER III.

TRAVANCORE AND MALABAR COASTS.—CAPE COMORIN TO MOUNT DILLY.

Travancore coast. Comorin to Alípee	72–79
Cochin coast. Alipee. Cochin. Paliport	80–82
Malabar coast. Cranganore. Beypore. Calicut. Cannanore. Mount Dilly	82–89

CHAPTER IV.

CÁNARA AND GOA COASTS.—MOUNT DILLY TO TIRACOL RIVER.

South Cánara. Kuvoy. Mangalore. Cundapur	90–94
North Cánara. Hog island. Pigeon island. Honore. Cumta. Sedashigar	95–103
Goa Coast. Cape Ramas. Goa. Tiracol	104–110

CHAPTER V.

SOUTH KONKAN AND PART OF NORTH KONKAN.—TIRACOL RIVER TO BOMBAY.

	Page
South Konkan, Réri point. Vingorla. Malwan - -	111–114
Viziadroog, Ratnaghíri. Jyghur. Anjenwil. Bankot -	115–122
North Konkan. Rajpúri. Choul. Kundári island - -	123–125
Bombay harbour - - - - - - - -	126–143

CHAPTER VI.

GULF OF CAMBAY.—COASTS OF NORTH KONKAN, SURAT AND BROACH.—PART OF GÚZERÁT.

North Konkan. Basseen. Sunján highland. Dánu - -	144–150
Damáon. Surat. Broach. Tankária. Cambay - -	151–163
Navigation of Cambay gulf. The Bore - - - -	164–169

CHAPTER VII.

KATIAWÁR PENINSULA.—CAMBAY TO DIU HEAD.

General description - - - - - - -	170, 171
Koon Bundar. Báonugga. Gogah. Perim island - -	172–174
Perim reef. Goapnáth point. Shalbet island - - -	175–179
Jafrabad. Diu harbour. Diu head, or Mandwa - -	180–185

CHAPTER VIII.

KATIAWÁR AND OKHA-MUNDEL COASTS.—DIU HEAD TO BATE ISLAND.

Katiawár, west coast. General Description - - - -	186
Mandwa. Veráwal. Seel Bunder. Porbunder. Miáni -	187–192
Okha-mundel peninsula. General description - - - -	193
Dwarka. Sainia island. Gurúr and Lushington shoals -	194–196
Mouth of the Gulf of Kutch - - - - -	197, 198

CHAPTER IX.

THE GULF OF KUTCH.

General Description. Kutch Mandavee - - - -	199–203
Nawinár point. Moondra. Búdresir. Toona - - -	204–207
Nukti, Kundlo, and Hanstul creeks. The Runn - -	207–209
Halár coast. Júria. Bálachéri. Nowa-Nugga - - -	210–212
Péritan. Déra. Núrira. Karúmba. D'húni. Chánka -	213–216
Burál reef. Chinri reef. Bate island - - - -	217–220
Islands and reefs between Bate and D'húni - - -	220–223
Winds and weather in the Gulf of Kutch - - -	223–225

CHAPTER X.

COASTS OF KUTCH AND SINDH.—MANDAVEE TO KARÁCHI.

Page
Soundings. Tides. Assar pagoda. Lukput river - - - 226–228
Sindh coast. River Indus. The Swatch. Munneja bank - - 229–232
Mouths of Indus. Karáchi - - - - - - 232–243

CHAPTER XI.

MALDIVH AND LAKADIVH ISLANDS.

General description. Channels amongst Atolls - - - - 244–250
Ad-du Atoll. Phúa Moloku. Equatorial channels. Suadiva Atoll - 250–257
The 1½° channel. Adu-Máti and Collomandu Atolls - - - 258–261
Nillan-du, Molúk, Pha-lee-du, and Ari Atolls - - - - 262–269
To-du island. Máli Atoll. King's island. Cardiva island - - 270–275
Horsburgh Atoll. Mahlos Mahdu. Phaidi Pholo. Milla-du Madu. Malcolm Atoll - - - - - - - - - 275–279
Tilla-du-Máti and Hea-wandu Pholo Atolls. Eight degrees channel - 279–281
Minikoi. Nine degrees channel. Lakadivh islands. Cherbaniáni reef - 281–289

CHAPTER XII.

WINDS IN INDIAN OCEAN AND NEAR MALDIVHS AND LAKADIVHS. CURRENTS.—VARIATION.—PASSAGES FROM THE CAPE OF GOOD HOPE TO HINDOSTAN.

Winds. Mozambique channel. Seychelles. Chagos. Maldivhs. Laka-divhs - - - - - - - - - 290–294
Currents. Variation. Passages - - - - - 294–302
Table of Positions - - - - - - - 303–306

IN THIS WORK THE BEARINGS, INCLUDING THE DIRECTION OF WINDS AND CURRENTS, ARE ALL MAGNETIC, EXCEPT WHERE MARKED AS TRUE.

THE DISTANCES ARE EXPRESSED IN SEA MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS THE TENTH PART OF A MILE, OR 101·26 FATHOMS, BUT ASSUMED TO BE EQUAL TO 100 FATHOMS.

THE

WEST COAST OF HINDOSTÁN PILOT.

CHAPTER I.

GENERAL DESCRIPTION OF THE WEST COASTS OF HINDOSTÁN AND CEYLON, AND OF THE CURRENTS, TIDES, AND MONSOONS. REMARKS ON MAKING PASSAGES.

COAST of HINDOSTÁN.—The peninsula of Hindostán is bounded on the south-east by the bay of Bengal; on the south-west by the Arabian sea; on the north-west by the Súlimáni range, and the hills of Belúchistán; and on the north-east by the Himalaya mountains, whose peaks are covered with snow, the melting of which supplies the floods of the river Indus. The Western Ghauts are the magnificent chain that runs north and south along the west sea-board, at a distance of 10 to 30 miles from the ocean. The mountainous region may be said to begin 200 miles north of Bombay, on the east of Gúzerát; but, the chain being broken by the Nerbudda and Tapti, the Western Ghauts are generally considered as beginning southwards from the latter river. Their northern part, forming the south side of the Tapti valley, is called Siádri, and thence to the Kundahs, the western mountains of the Nilghiris, the chain is 800 miles long. Then comes a gap about 20 miles broad, called the Pálghát valley (through which the Madras and Beypore railway passes), and then a further extension southwards of the chain of the Ghauts for nearly 200 miles to Cape Comorin, where the sea may be said almost to wash their base.

On the north and west of this mountain chain we have an immense desert (the hills of Kutch and Katiawár standing up merely as islands out of the vast plain, quite on the sea-face of this desert), and beyond this the river Indus, or Sindh, skirting in its course the eastern base of the Belúchistán and the Súlimáni mountains.

The vast table-land of the Deccan, shelving or sloping gently eastward from the eastern sides of the Ghauts, is bounded on the north by the high lands of Malwa, and extends eastward for hundreds of miles, and southward till terminated by the mountain spur which stretches from the Nilghiri mountains towards Madras.

A border of low land stretches from the base of the western mountains to the sea margin, varying from 5 to 50 miles in breadth, and its average elevation is about 30 feet above the sea's level; this belt of low land is broken in a few places—Cape Comorin, Mount Dilly, and Carwar head—by spurs running from the Ghauts into the sea. In consequence of the immense rain-fall against the west sides of the Ghauts, this low tract is traversed by many rivers, which in the south of India form that extraordinary series of shallow lakes called backwaters.

The red appearance of the low hills, along the Malabar and Travancore sea-board, is owing to the laterite rock of which they are formed. This formation is the overlying rock, almost without interruption, from south of the Mahableshwur hills to Cape Comorin, covering the base of the mountains and the narrow slip of low land. Laterite is a ferruginous clay, easily cut when first quarried, but, by continued exposure to the atmosphere, it becomes as hard as brick, and is the grand building material along the whole coast.

Thus it will be seen that the peninsula of Hindostán has four distinct features,—firstly, a central table-land of an average elevation of about 1,500 feet; secondly, a wall of mountains along its west side, clad with verdure, and averaging in elevation about 4,000 feet, but in the south attaining to 8,000 feet at the Nilghiri hills; thirdly, the low belt betwixt the foot of the mountains and the sea; and fourthly, the vast desert-like space from Guzerát to the west extreme of Sindh, which is shut in by the Púlí mountains, the hilly barrier that marks the north-west frontier of the British dominions.

There are a great many rivers along the west coast of Hindostán, but, as the mountain ridge runs so close to the sea, their courses are of limited length, and their navigation is confined to an average of a dozen miles from their mouths; in fact, these rivers may be simply regarded as the discharge pipes for the flood of rain-water which, in the S.W. monsoon, is precipitated against the face of the Ghauts, and rolls to the sea in impetuous torrents. Northward of Bombay are four large rivers, emptying themselves into the Gulf of Cambay, the Tapti, Nerbuddah, Myhé, Sabermati.

The Nerbuddah has its source in the Vindhya mountains in the Bengal presidency, about half-way between Calcutta and Bombay, at an elevation of between 3,000 and 4,000 feet above the level of the sea, into which it

falls after running a west course of 800 miles. The influence of the ocean tide is felt about 50 miles from the sea, and throughout this part of its course the river's breadth averages one mile. Vessels of 100 tons can ascend at high tide to the town of Broach, nearly 30 miles from its mouth, but skilful pilots are necessary.

The Tapti, running nearly parallel to but some 30 miles southward of the Nerbuddah, has a course of little more than 400 miles, in which it descends more than 2,000 feet from its source not far from Nagpore; it is much inferior to the Nerbuddah, but is still a very respectable stream; serious loss of life and property has been occasioned by its overflow in the rainy season. At high tide steamers can go up to Surat, about 16 miles from its mouth, but at low water in the dry season the river is fordable at that place.

The Myhé is smaller than the above, the length of its course being about 330 miles, and the elevation of its source less than 1,900 feet. At the town of Cambay, near its embouchure in the gulf of that name, the bore-wave is experienced every flood tide at the springs, when the maximum initial velocity of the tide is, for a few minutes, at the rate of 10 miles an hour, thus rendering the head of the Cambay gulf very dangerous to vessels which are so unfortunate as to get aground on the numerous banks.

The Sabermati, the northernmost river of the Gulf of Cambay, runs a course of nearly 200 miles in a southerly direction past the city of Ahmedabád from near Mount Abú in Rajputána; its navigation is limited to about a dozen miles from the sea, and at spring tides it experiences the bore-wave, though to a less extent than the Myhé river.

Passing over the province of Katiawár, in which there is scarcely any stream worthy of being called more than a rivulet, we come to Sindh, whose noble river the Indus, with its many mouths, is by far the most important one on the west coast of India. From its source, at an elevation of some 18,000 feet in the Thibet country, north of the Himalaya mountains, the principal stream of the Indus travels in a general north-west direction for nearly 700 miles, then turning westward, and breaking through the Hindu Kúsh range, trends south-west and south past Attock and Hyderabad to the sea, a further distance of 1,100 miles, thus making its entire length about 1,800 miles. At Attock, the limit of the upward navigation of this river, and some 900 geographical miles from its mouth, its bed is about 1,000 feet above the sea, thus making the fall in its navigable course to be little more than one foot per mile.

The delta of the Indus is composed of thirteen estuaries, and their mouths are spread over a sea-face of 100 miles; all these discharge more or less water during the inundation season, but in the winter, or season

of low water, the Indus discharges fresh water by only one channel of importance, the Kukiwári. The inundation of the country that borders on the Indus (unlike that of the Malabar coast and Gulf of Cambay, which is caused by the rains,) originates with the melting of the snows in the Hindu Kúsh and Himalaya mountains; commencing in spring, about 23rd March, it retrogrades as autumn advances, about 23rd September, having attained its maximum in the first week of August, when it spreads the alluvial matter the water has held in suspension over the face of the country, thus annually renewing the fertility of the soil. The unhealthy season on the banks of the Indus is when the inundation subsides.

COAST of CEYLON.—This island, known as Lanka by the natives of India, lying off the south-east extremity of the continent of Hindostán, from its peculiar configuration and position nearer the equator, needs some general description, that any points of difference between its seasons and those of Hindostán may be comprehended. Its extreme length north and south is 240 geographical miles, and its greatest breadth, on the parallel of Colombo, is just the half of its length. The northern half of the island is flat and low, but the southern half is mostly mountain region (separated from the nearest ghauts of India by a gap of 200 miles), and from its great elevation and isolated position, by arresting the winds from all points of the compass, causes a considerable amount of rain-fall to be experienced, in some part or other of the island, during every week of the year. The greatest quantity falls on the south-west portion of Ceylon in the month of May, when the wind is intercepted and its moisture condensed by the lofty mountain ranges surrounding Adams Peak; this maximum rain-fall anticipates that of the west coast of Hindostán by more than one month; then in July and August (a time of heaviest rain near Bombay) Colombo has very little; but in November there is another large down-pour, corresponding with that of the Coromandel coast. Thus does the Ceylon climate partake of the characteristics of both Malabar and Coromandel. Snow is unknown in the island; hail occasionally falls amongst the western hills at the change of monsoons.

In the northern extreme of Ceylon the land is of recent formation, the production of the coral polypi conjointly with the currents which, coming from the Madras coast for half the year, laden with sand and alluvial matter, deposit their burden on the coral reefs round the north of the island, where the land has been gradually but slowly rising, as evidenced by the fact that terraces abounding in marine shells occur in situations far above high-water mark. There cannot be a doubt that the general effect of the currents between Ceylon and India is to make the straits gradually shallower; though the agency of successful engineering operations has deepened the Paumben passage so favourably for small

craft, it is too much to hope that it may ever be sufficiently dredged out for large vessels, so as to save them the long sea journey round the island.

SOUNDINGS.—The outline of the bank of soundings along the entire western shore of Hindostán (excepting a small portion off the Tinavelly coast and off Aripo in the gulf of Manár, and a small strip off the south-west corner of Ceylon) is now well depicted on the charts, but the nature of the bottom varies so much that but little general description can be given. In the Gulf of Manár it is principally sand and coral rock, and the same off Cape Comorin. Along the Malabar coast, southward of Quilon, there is little or no mud; northward of that place to Mount Dilly, the mud extends out to the depth of 20 fathoms; and above that cape, out to 30 fathoms.

Upon the coast bank of soundings there are some few shoal spots which serve as direction banks to contiguous harbours; these will be noticed off their respective ports. But there are also some outlying banks, between which and the bank of soundings there is no bottom obtainable with the deep-sea lead; some of these are fully described in the section Lakadivhs, but are likewise here noticed as forming the western side of the channel between those islands and the Malabar coast. These outlying banks are the Elicalpéni shoal, the Padua banks, and Angria bank. The first only of these is shallow, and must be avoided as dangerous; the others, being well submerged, may be sounded upon to get a knowledge of the ship's position.

Elicalpéni bank, 30 miles N.E. by N. of Anderút island, is the eastern danger of all the Lakadivhs; and, though not supposed to have less depth than 3½ fathoms, is, at all times, to be avoided, being composed of sharp coral rocks, on which a large ship would probably strike, when the sea is running high. This bank is in the latitude of Calicut, from which place it is distant rather more than 100 miles.

Padua Banks, called also Bassas de Pedro, and by the islanders Munyal-par and Cora-divh, the north-east banks of the Lakadivhs, may be safely sounded upon, having no less than 20 fathoms water. On the little Sesostris bank, to the west of Padua banks, the least water found was 11 fathoms. Therefore these banks may be safely sounded upon to ascertain a ship's place.

It is probable that other banks may exist between the last named and Angria bank, but no examination is known to have taken place, though Ada's bank, with 38 to 52 fathoms, is reported as lying between the 14th and 15th parallels.

Angria Bank.—The east extréme of this bank, having a depth of 15 fathoms, is 65 miles due west from Viziadroog. In length nearly north

and south it is 22 miles ; in greatest breadth, 12 miles ; least water ever found was 11 fathoms towards the northern part ; but, as much live coral was found there, the depth may decrease in course of time. It is steep all round, with deep water between it and the coast bank of soundings. While the surveying vessel was anchored on it, in the end of November, the rise and fall of tide at springs was 9 feet, high water a little before 11 h. Angria bank is essentially the direction bank of Viziadroog.

CURRENTS.—Those along the west coast of Hindostán seem entirely dependent on the monsoons. It is known that, round the south side of Ceylon, while the N.E. monsoon prevails in the Bay of Bengal, a strong current runs to the south-west, sometimes 50 or 60 miles a day. At the same time there is a drain in the same direction through Adams Bridge down the Gulf of Manár ; this is more felt along the west coast of Ceylon than near Comorin ; but, in January, it sometimes causes a north-west set, up the Travancore coast, to Anjenga. On the other hand, in the S.W. monsoon, the current sets into the Gulf of Manár, and northward through Palks straits ; along the south coast of Ceylon, it then sets strongly to the eastward.

The Malabar coast is indeed without anything to call a current in the N.E. monsoon, except after February, when the wind takes a north-west character, and then there is a drain of lee-current southwards, especially off Mount Dilly, increasing in March and April, when the north-westers blow stronger.

In May, when variable winds take the place of the north-westers, there is little or no current along the west coast ; but when the wind veers to the southward and blows fresh, it brings with it a current setting northward.

The existing nautical directories, for the coast of Bombay, tell of this current setting up the coast into the Gulf of Cambay in the months of May and June, whenever the wind veers to the southward, and at the commencement of the S.W. monsoon ; but it is believed that the occasions are rare indeed when the current obliterates the ebb tide of the Cambay gulf. The southerly winds doubtless produce a current which tends to increase the strength of the flood stream and prolong its duration ; but, one week after the rains have commenced, there is such a body of water in the freshets of the many rivers of North Konkan and Surat, that the coast current must then have a strong southerly tendency.

In July, when the rains have swelled the rivers, producing great outsets, its strength is much increased, and then, during the period of the ebb tide off Bombay, that is to say, for 7 or 8 hours at a time, the navigator must reckon on a southerly current of at least 2 knots an hour, extending 10 miles off shore.

Throughout the S.W. monsoon the strongest regular current of any time of the year is experienced setting southwards; below Bombay it averages about one mile an hour; off Mangalore near the coast 2 miles an hour; off Cochin and to Comorin, even 3 miles an hour sometimes, although this extreme rate is only felt within 20 miles of the coast, and in the offing the average may be stated at 30 miles a day. This southerly current continues along the last-mentioned portion of coast during September and the early part of October; for the rainy season in Malabar is not considered over till the full moon in the latter month, and the fresh waters of all the west coast rivers are amalgamated towards the southern extreme of the peninsula. The set is with the direction of the coast; the influence of the river ebbs, in general, not extending seaward so far off as a vessel should in prudence navigate along this sea-board, excepting off Bombay, as above stated.

On the Katiawár coast, during the months of November and December, the current sets almost always to the north-west, from 1 to 1½ knots per hour; but was liable to checks, particularly at night, when there was sometimes a drain in the opposite direction. After the middle of January there was found no current; but again, from the end of March to the beginning of May, it frequently sets south-east 12 to 20 miles a day; and during the S.W. monsoon it sets strong in the same direction, south-east.

Off the coasts of Sindh and Kutch the currents occasionally set to the south-east. After strong west winds, during the monsoon off the coast of Sindh, it was reported in July and August 1854 as having set south-east 30 to 40 miles a day. In the middle of September, between the parallels of 20° and 22°, and the meridians of 64° and 66°, the current has been known to run South and S.S.E., from 12 to 20 miles a day, for 10 consecutive days.

From December to March, between the Lakadivh islands and Africa, the current sets with the N.E. monsoon to south-west. In March and April, about the Lakadivhs, and to the westward of them, it sets mostly to the southward and south-west, particularly in March, when the N.E. monsoon continues throughout this month at times, and even to the first week in April, in the open sea between the islands and the African coast. It may be observed as a general rule that the surface current, which affects a vessel, is governed by the wind, always setting to leeward when the latter blows in one direction any considerable time. In May and June, in the open sea to the westward of the islands, the current sets usually to the eastward; in July and August stronger than in the preceding months, or about 15 to 20 miles a day; in September and October it sets to the southward, but not strong.

TIDES.—The tidal wave strikes Western Hindostán from the west, at

right angles to the mean direction of the shore line, thus causing very little difference in the times of high water along the whole length of coast, excepting of course when the wave has to run up indentations of the land, such as the gulfs of Cambay and Kutch.

From about Jyghur, that is, 100 miles south of Bombay, to Mangalore, and Mount Dilly, high water occurs at about the same hour, 10 h. 45 m., and no tidal stream is observed along the coast, except just off the mouths of rivers where the ebb seems to go straight out to sea, and the flood sets dead on to the embouchures.

Along the coast of North Konkan the flood stream sets to the northward; off Bankot a vessel feels it sensibly, and its strength increases with the latitude, till, at the river of Cambay, it finishes with the well known "Bore" of the Myhé and Sábermati rivers.

Southward of Mount Dilly the flood stream is just appreciable as coming from the north-west, and off Cochin it is plainly so. Between Cochin and the west coast of Ceylon the irregularities of the tides and the diminished rise and fall seem to indicate some unusual cause.

At Colombo four floods and four ebbs have been observed in the course of 25 hours, the difference of high and low water being only 6 inches. This may be attributed to the bifurcation of the ocean tidal wave at the Maldivh group, which has the same effect as a continent interposing. Northward from these islands two waves advance; the one, inclining eastward, toward the gulf of Manár, causes high water about simultaneously at Colombo and Cape Comorin, and this is six hours earlier than the other, the regular wave of the Malabar coast, which we have before mentioned as causing high water later at Cochin than at Mangalore.

Karáchi and Porbunda receive the tidal wave earlier than any other ports of India, and hence we see the flood tide setting eastward along the coasts of Sindh and Kutch, northward along the Okhamundel coast above Porbunder, and south-east below that place along the Katiawár coast to Diu head, where it was found to run 1 to 1½ miles an hour to the eastward. Off Diu head there are frequently eddies, doubtless caused by the ebb stream of the gulf of Cambay running westward while the flood stream from Porbunder is running eastward.

Where evaporation is so great as it is in the Indian seas, there are doubtless some local movements of the ocean water dependent upon that cause; where the rise of tide is great, as in the Gulf of Kutch, this cause may be little appreciated; but at Cochin, whose river mouth is the embouchure for the many mountain streams which flood the vast backwater, the ingoing stream has been known to be constant for 20 hours, although the regular but inconsiderable rise and fall, of little more than one foot, has been marked on the tide gauge. The evaporation

over the shoal banks of the immense Cochin backwater must be far greater than over a like area in the deep sea, for the quantity of water evaporated is always in proportion to the extent of surface and the depth of the evaporating mass.

GENERAL REMARKS on the WINDS.—The navigation of the west coast of Hindostán is perhaps less hazardous than that of any equal length of coast in the world. As the winds are generally favourable for sailing down the Malabar coast, particular directions for its navigation southwards are not needed for the fine season, when the mariner has but to trim his sails and seldom to alter his course; for a southerly current, the product of the many rivers, helps his vessel onwards in the six weeks or so of calms and light winds which prevail after the S.W. monsoon, until the land and sea breezes are fairly established.

The fine season is from October to May; and, for its four middle months, alternating land and sea breezes prevail without intermission, affording pleasant and speedy passages either northwards or southwards; and for the residue of this period, or the months of change between the monsoons, the veering of the wind through six to eight points of the compass, in the vicinity of the land, only requires a little study or practice before the navigator should be able to make good progress in his voyage up the coast.

But although throughout the Arabian sea, from Hindostán to Africa and Arabia, and amongst the Lakadivh and Maldivh islands, the N.E. monsoon is constant in direction and force for half the year, the peculiar configuration of the lofty west coast mountain chain of Hindostán causes such anomalies in the prevailing winds as fairly to take away from the season the name of N.E. monsoon, that is to say, so far as the characteristic wind along the sea-board is concerned; though we here retain the name as indicating that period of the year when the sun is south of the equator.

Attention to these remarks will enable the navigator to understand the discrepancies in the writings of different physical geographers, whose atlases will certainly tend to confuse him with the diverse accounts they furnish. Thus we read of the "North-west monsoon" of Bombay, by which is meant the period between February and the S.W. monsoon, in which the land wind is scant and undecided, and becomes, like the "along-shore" south winds of Madras, at the same season, merely a slight modification of the sea breeze. The winds off the coasts of Konkan, Cánara, and Malabar at that season, veer only between North and W.N.W., the former springing up an hour or two after midnight, the latter before or about noon.

The air on the surface of the earth seems continually to rush towards that point, or, properly speaking, that belt of latitude on which the sun's rays are concentrated. Thus, from October to April there is a great rush of that vast sea of air, which the mountains of central Asia have cooled, perpetually flowing for six or seven months towards the south, and this constitutes the northerly or N.E. monsoon. Steadily as the sun, having crossed the line, increases his north declination, the winds become less northerly and more westerly, thus forming the north-wester season of the Malabar coast, till the setting in of the S.W. monsoon brings a rush from the southward for about three months.

These two masses of air, the N.E. and the S.W. monsoons, thus set in motion from opposite directions, are also totally opposed to each other in character. That from the north is cold and dry, from the expanse of arid desert which it has traversed, where it has thrown off all its moisture in the shape of snow, winter rains, or dew. That from the south-west, sweeping over thousands of miles of sea surface before it reaches Hindostán, comes saturated and laden with moisture. The intermediate wind—as we may call the North-wester of the west coast from Karáchi to Cape Comorin—shows from its dampness, as soon as the sun has set, that it is essentially an ocean wind to cool the heated belt of low land lying betwixt the Ghauts and the sea.

GALES.—The west coast of India is occasionally, but by no means frequently, visited by very violent storms (excepting the steady S.W. monsoon gales), and this partial exemption must be attributed to the lofty wall of mountains that shuts it off from the bay of Bengal, where storms seem much more frequent. Nevertheless, some severe gales have been experienced, and these are recorded for two-thirds of the months in the year.

During the early voyages of the Portuguese along the Malabar coast, storms appear to have sometimes happened in January ; at present this is the most pleasant month of the season.

In February, strong West gales are said to be sometimes encountered off the mouths of the Indus ; in 1833 the E.I.C. schooner *Shannon* was caught in one which lasted 12 hours, causing the destruction of about a dozen large native vessels. Another account* speaks of the N.E. winds in this month, off the coast of Bombay, being interrupted by sudden squalls from south to west, against which the seaman must be guarded. On February 3rd, 1857, the E.I.C. steamer *Ajdaha*, at 70 miles south-west of Dwarka, had strong winds from S.W. for 12 hours, shifting in a violent squall to N.E. with heavy rain. Horsburgh speaks of a

* Beecher's Navigation of the Indian Ocean, 1859.

strong gale at North for 12 hours, off Choul, in the second week of February, 1791.

For the month of March there is no record of a gale, but the North-westers of the coast are pretty brisk sometimes towards evening.

In April, some gales (cyclones) have been experienced. In 1782 a very heavy storm from the Southward blew on most parts of the coast, in which men-of-war and merchantmen foundered. Since that time no severe storm was recorded till that of 1847, commonly called *Cleopatra's* cyclone, because the E.I.C. steamer of that name foundered somewhere off Mangalore on that occasion. This was felt off Ceylon, and travelled up the whole coast, the vortex passing at no great distance; thus, the trend of the shore-line being north-west, the storm took the character of a S.E. gale, right along the coast from Cochin to Goa; whereas, in the offing, that is to say, 100 miles from land, some ships had it beginning from N.E. and ending at N.W.

In May, heavy gales from S.W., in anticipation of the monsoon, have been occasionally experienced off Bombay. Most of these Southerly winds of April and May are preceded by or attended with a luminous sea at night, caused by fish spawn, and medusæ, minute globular bodies linked together; in the daytime they give a dirty brown or reddish appearance to the water.

In June, in some seasons, ships have been dismasted at some distance from the coast, when the monsoon has commenced with severe storms; that of June 1837 was particularly disastrous to the shipping in Bombay harbour, and the *Shah-Byramgore* was wrecked near Versovah, in a heavy gale from the westward, that set in after she had worked out of Bombay. In 1811, in this month, a storm was felt by a vessel some miles to the south-west of Bombay.

The steady gales of the S.W. monsoon, though violent at times in June and July, and frequently bringing ships to close-reefed topsails, not being of the character of revolving storms, or sudden unexpected gales, will not be spoken of here, but in their place under the head of monsoons.

Sometimes in the end of September, but more generally in October, the Elephanta gale happens at Bombay, often blowing violently for several hours from S.E. and South. This stormy period, which ushers in the rainy season of the Coromandel coast, and closes that of the west coast of Hindostán, has happened late in October, and sometimes early in November, after which the N.E. monsoon is fairly established. Occasionally, however, the monsoon of Bombay breaks up without any storm of wind.

In one of these S.E. gales which happened at Bombay about the

beginning of November 1799, several ships were driven from their anchors in the harbour; it veered to the eastward and blew a hurricane for some time; the ships *Hercules* and *Hunter* drove on the rocks under the castle; the latter was completely wrecked, the other obliged to undergo repair.

In November 1851 a gale occurred between Bombay and Karáchi, in which the steamer *Surat* foundered; this gale was felt in the Gulf of Kutch, as recorded in the chapter on that portion of India. In the beginning of November 1854 another severe disastrous gale was felt at Bombay, and along the Konkan and Goa coasts, from S.E. and South.

For December, which is such a beautiful month generally, we have recorded a gale from the S.E. and N.E. to East, as occurring to the E.I.C. sloop *Elphinstone*, when 120 miles to the west of Dwarka. This appears to have been local, and was doubtless the weather against which Horsburgh warns the mariner in his Passages from India to Muskat, thus, "with the Gulf of Kutch open, it sometimes blows strong at East and E.S.E., accompanied by cloudy weather. When the wind is Northerly, the sky is clear and serene; when N.E., beware of sudden squalls, indicated only by the rapid motion of a small cloud that accompanies them, giving very little warning."

The above statement of gales that have occurred throughout the year will suffice to put the navigator on his guard, should indications of coming tempest present themselves in the sky, especially at the periods of change between the monsoons.

CYCLONES.—Of the gales above recorded, those disastrous ones of April and November, or the latter part of October, were decidedly revolving storms, whose centres, passing to the westward of Ceylon, travelled north-westerly, at some little distance from the coast, under the lee of that mountain wall, the Western Ghauts. Thus, along the sea-board, they assumed the character of S.E. gales, whilst the vortex was nearest to, that is, opposite each port, when of course the wind was most violent. A very low and falling barometer heralded that of April 1847; and as such a great depression of the mercury never accompanies the ordinary strong winds of the Malabar coast, such an indication, in April or November, with a stormy sky, should not pass unheeded by the mariner. Some of the Lakadivh islands were partially for a time submerged by the storm wave of the April cyclone of 1847, and the inhabitants state that such an event has happened before.

In October 1842, a cyclone, which had its origin in the bay of Bengal, seems to have passed over the continent of India, about the 11th parallel of latitude, (where there is that low gap at Púlghát, between the Nilghiri and Anamullay mountains,) and rolled away westward of the Lakadivh

group for some hundreds of miles, but not so far as Socotra or the Arabian coast.

As the character of these revolving storms is now well understood through the researches of Redfield, Reid, and Piddington, a vessel passing up or down the Malabar coast at the above epochs may be navigated so as to avoid the centre of the storm, and even advanced on her course, by attending to the directions given in some of the works of the above eminent authors; no vessel trading to the East Indies should be without "Piddington's Horn Book of Storms."*

LAND and SEA BREEZES.—The limits of the season, in which these are experienced, are from the autumnal to the vernal equinox, but, with such a wall of mountains as we have along the western coast, the strength and duration of the land winds depend much, as might be expected, upon the configuration of the land. The land wind of the Gulf of Manár and of all the Malabar coast is of course only the N.E. monsoon of the Bay of Bengal, similarly as the land wind of the Coromandel coast is a prolongation of the Malabar S.W. monsoon.

Thus we find that, where there are gaps in the mountain chain, as at Pálghát, on the south of the Nilghiri mountains, the land wind in December and January off Ponáni continues to blow for more than a whole day without any intervening sea breeze sometimes. This occurs also, but in a rather less degree, off Carwar head, where the valley of the Sedashigar river assumes a straight funnel-shape to the eastward, towards the interior table-land.

Again, in the Gulf of Kutch, and off the Sindh coast, the North-east winds, in January, sometimes blow for 40 hours at a stretch, merely relaxing in force at the hours when a sea breeze is due, and being strongest in the morning two or three hours after sunrise, when the land winds are usually strongest. At such times as these continuous land winds blow, the parching dryness of the atmosphere is most trying.

In acquiring a knowledge of the land and sea breezes of the west coast of India, we shall do well to look at those of the same period on her south-east coast. On the west coast of Ceylon land and sea breezes occur in December and January, beneath the mountains of the island, as on the Malabar coast; but the winds along the Indian shore of the Gulf of Manár do not assume the character of land and sea breezes, until February; from the middle of November till that month they are N.N.E. to N.E. In February, when Madras gets her sea breeze in the afternoons from S.E. to S. (the "along-shore winds"), the Tuticorin coast

* *See also* "Remarks on Revolving Storms," published by order of the Lords Commissioners of the Admiralty in 1853.

gets the same, but there of course "dead on" to the shore. By April, the general direction of the wind, in the northern part of this gulf, is found to have drawn round to the southward, the sea breezes being from S.E. on the Indian shore, and from S.W. along the northern Ceylon shore, but N.W. between Colombo and Point de Galle, as they are then N.W. along the whole Malabar coast. What is called the "along-shore wind" at Colombo, on the west coast of Ceylon, is a dry cutting wind coming from about N.N.E. over the low land; it cracks furniture, and is dangerous to sleep in, like the easterly land winds of the Malabar coast.

The sea breezes of the Malabar coast are fairly established throughout October, (while as yet the land winds are only occasional, light, and uncertain), and they seldom fail, except in the peculiar localities already noticed, till they are merged in the S.W. monsoon. Thus the navigator may calculate on sea breezes for eight months of the year, but on regular land winds for only half that period. It is of course the sea breeze that makes the climate of the west coast so pleasant during the fine season.

Further remarks upon these land and sea breezes, with directions how to profit by them, will be found under the head of North-east Monsoon.

The NORTH-EAST MONSOON, or fair weather season, generally commences about the middle of November at Bombay and on the northern parts of the coast; but sooner to the southward of Mount Dilly, about Calicut, Cochin, and Anjenga. At the observatory of Dodabetta on the Nilghiri hills, at the elevation of 8,600 feet, the winds are N.W. for the first half of September, and have veered to N.E. before the end of the month; throughout October, increasing in force; in November, fresh; in December, often violent. The navigator may therefore expect N.E. winds below Calicut throughout the month of October. The strong south-west and westerly winds, off the Konkan coast, fail after the middle of September, and are followed by light variable breezes, frequent calms, cloudy weather, and showers at times. This unsettled state of the weather, between the monsoons, generally begins late in September, and continues 6 or 8 weeks; the prevailing winds are from N.W., in the shape of sea breezes, but at times from S.W. and southward; at other times squalls may happen, blowing from the land, although these are seldom experienced in September or October, except on the Cánara, Malabar, and Travancore coasts.

At the breaking up of the S.W. monsoon there is often much thunder and lightning; it is sometimes attended with a sudden storm from southward, which veers to S.W., but generally to S.E., blowing very violently for several hours. This storm has generally happened late in

October or early in November,* after which the N.E. monsoon sets in, with land and sea breezes and fine weather; but the monsoon frequently breaks up without any storm.

The navigation northwards in October and great part of November is usually tedious and uncertain, for there is no dependence on the winds till late in November; but, though light, they cannot on the whole be called unfavourable for sailing down the coast, and the drain of current to the southward, fed by the freshets of the many rivers, aids a vessel's progress amazingly. About the beginning of December the sky becomes serene, with land and sea breezes favourable for sailing up and down the coast.

In this clear weather, in December, January, and February, when these land and sea breezes are regular, the sea is remarkably smooth near the coast, and the sky very serene without any clouds; but in April the weather becomes hazy, and at times cloudy over the land in the evenings, with light showers.

In December and January the land winds are regular and strong; and at times, to the southward of Calicut, they continue to blow through a large chasm in the Ghauts upwards of 24 hours, without any intervening sea breeze. In these months a passage may sometimes be made from Cape Comorin to Bombay in 6 to 8 days, and the return voyage in 4 or 5 days. In November and early in December the sea breezes are very weak, but become stronger afterwards. As February advances, the land breezes decrease in strength and duration, and are not always regular.

When the land and sea breezes are regular, the latter fail in the evening about sunset, and are generally followed by a calm, which continues until the land wind comes off; this may be expected to commence at 8 h., 9 h., or 10 h. p.m.; at first, it comes in fluctuating gentle breezes, but soon becomes steady between N.E. and E.S.E., continuing so till 9 h. or 10 h. a.m. next morning; it then begins to fail, decreasing to a calm about mid-day. About this time, or a little past noon, the sea breeze sets in from W.S.W., West, or N.W., a pleasant refreshing wind, and generally veers to the northward in the evening, then decreasing in strength.

These land and sea breezes require the attention of the navigator to benefit by them to the full extent. During the night, with the land breeze, it is prudent to keep well in shore, if the wind will admit, without tacking, for there it is stronger and more steady than further out; but in the morning it is advisable to edge more out, to get an offing of 15 or 20 miles, or in soundings of 26 or 30 fathoms before noon, ready for the

* *See* Section on Gales, page 10.

sea breeze. In the evening, it is proper to be near the shore, before the land breeze comes off; the coast may be approached to 8 fathoms in most places from Bombay to Quilon, and if a vessel gets close in, prior to the commencement of the land breeze, she ought to make short tacks near the shore until it comes off; when calm, its approach is frequently known by the noise of the surf on the beach, which is heard at a considerable distance.

In March and April the land breezes are very faint and uncertain, seldom coming off till morning, and continuing so short a time that little advantage is gained by them, as ships are obliged to stand nearly right out to gain an offing, to be ready for the sea breeze. In the former months, the land breezes are generally the strongest winds, but now the contrary, for the sea breezes prevail greatly. They may at this time with propriety be called N.W. winds, for they usually set in about noon at W. by N., or W.N.W., veering gradually to N.W. and N.N.W., in the evening, where they continue during the first part of the night, declining afterwards to a calm about midnight, or early in the morning. A faint land breeze sometimes follows; but, more frequently, light airs from the northward or calms may be expected, nearly from midnight until the N.W. wind sets in about noon on the following day. These N.W. winds, at the full and change of the moon more particularly, blow strong, producing a short chopping sea and a drain of lee current, making it necessary to anchor at times with a light anchor, when it falls calm, to prevent being driven to the southward.

In April the weather is mostly hazy, and at times cloudy over the land in the evenings, with light showers. In some seasons, gales have been experienced, as stated under the head of gales, at page 10.

In May the prevailing winds are from N.W. and West, but often very variable and uncertain, with cloudy threatening weather at times, and lightning from S. eastward, and light showers of rain. A gale from S.W. or Southward is liable to happen in this month, by which several ships have speedily run along the coast to Bombay; but it is prudent to keep well out from the land, prepared for bad weather, to prevent being driven on a lee shore if a storm should set in from the westward. When N.W. winds prevail, the weather is settled and clear of clouds, though a little hazy, but cloudy and threatening when they blow between S.E. and S.W. It sometimes happens that heavy clouds collect over the land in the evenings, producing a hard squall from it with rain about midnight; this has frequently been experienced between Mangalore and Hog island, both in May and early in June, when these land squalls blow in sudden severe gusts through the gaps between the mountains.

During the period of change before the S.W. monsoon, the small

coasters run, in the afternoon, into the nearest river or place of shelter, but large vessels would do well to give themselves sea-room. The boldest sailors of the coasting vessels now venture to continue making trips up the coast to Bombay till overtaken by the S.W. monsoon; they seem now to be sure of an interval of one week's fine weather, if a first burst of the monsoon comes in the last week of May, for its due time is the first week in June.

In the Gulf of Manár the N.E. monsoon sets in with force about the middle of November, and lasts till the end of January. It blows steadily from N.N.E. along the Indian shore, but on the opposite coast, the north-west part of Ceylon, it is modified into land and sea breezes, with very fine weather. In February land and sea breezes commence on the Indian side; and, by April, the general direction of the wind in the gulf will be found to have drawn round to the southward; the sea breezes being from S.E. to S.W., according to the coast on which they prevail; this is also the season of the Madras along-shore South winds. These sea winds of Manár now become of longer duration and increase in force till about the middle of May, when the regular S.W. monsoon sets in on the Ceylon coast, anticipating by a few days that of the Indian coast.

The SOUTH-WEST MONSOON.—On the west coast of Hindostán the S.W. monsoon may be said to prevail for the five months of summer, and the N.E. monsoon for the five winter months, an interval of storms and calms occurring, in both cases, at the period of change. It is usually held that this change takes place about a week after the passage of the sun northward or southward over the parallel of the place; and that the rains, which always accompany it, follow or retire a few days afterwards. Thus, on the north coast of India the period of the rainy season is of limited duration compared with that of Malabar. Few things can be more striking than the state of the atmosphere, or the aspect of the sky, as these periodical alterations are about to arise.

From the beginning of November to the end of May the sky has been cloudless (comparatively speaking, for in the north-east monsoon there are mare's tails and other light clouds which float in the higher atmosphere), and not a shower has fallen. Regular sea and land breezes, setting in before noon and day-break respectively,—the former blowing from N.W. to West for 9 or 10 hours, the latter from East to N.E. for 5 or 6 hours, with intervals of calm between,—have filled up the day and night. Large clouds at length begin to make their appearance daily at noon, over the mountains; and, advancing up the sky from eastward, right in the teeth of the sea wind then blowing, exhibit a grand *display*, first of sheet, afterwards of forked lightning; after dark the whole disappears. This goes on from day to day for a week or more, the

electric displays becoming more and more vivid and intense every evening. Until the rains actually fall, the clouds invariably disappear immediately after dark; and, though the sun may be gone down amid signs of coming tempest, the stars show a cloudless sky down to the very horizon two hours afterwards.

Suddenly, after perhaps a week as above, in the evening a little after sunset, a blast of wind at once darts forth from the stacked-up clouds in the east, followed by a heavy gush of rain, with thunder and incessant lightning flashes, which sometimes shoot upwards from the earth, sometimes seem to rain down in long streams reaching from the upper clouds to the sea, but most frequently darting in long zigzags horizontally from cloud to cloud, or bursting like a shell in all directions from a single point.

This state of matters generally lasts from one to two hours, when the wind veers round to South-west, blowing with increasing steadiness and diminished force, and the thunder is only heard in the distance.

The first burst of the S.W. monsoon seldom lasts more than a single night and part of a day; and, on the second dawn, the entire face of the burnt and parched earth seems washed and refreshed. The rays of the sun, no longer fierce and intolerable as they were a week before, now shaded by transient clouds, present alternations of light and shade in the landscape, which exhibit a striking contrast to the unceasing glare of the previous part of the year. After a few days' fine weather of this sort, during which the S.W. wind is strongest in the afternoon as a sea breeze, the sky gets more over-cast, and continuous squalls from the south-west quarter announce that the monsoon has fairly set in; the rains return with redoubled violence, and continue to pour down for 40 or 50 days with an occasional interval of a few days' fine weather. The rain-fall, in June, July, and August alone, amounts at Bombay to about 70 inches.

It has been observed at Bombay that the first stormy weather of the S.W. monsoon seldom comes with the full moon springs, but generally during the dark nights. Although Southerly winds prevail greatly after the middle of May, the stormy weather and rain usually do not set in until the dark nights, some time between the 8th and 15th of June. From the first week of June to the 15th or 20th of July, the weather is generally most unsettled and severe; hard squalls, much rain, and dark cloudy weather may then be expected in the vicinity of Bombay harbour.

The rains at Bombay slacken off early in August; and the natives, on the first full moon of that month, celebrate the departure of the monsoon, on what is called Cocoa-nut day. The boldest then put to sea; and all their vessels, having been laid up and hutted in since the end of May, now prepare for sea.

After some weeks in September of open weather, mostly fine and pleasant, but frequently showery, the coast beneath the Western Ghauts (called in general the Malabar coast), is usually visited in the end of September, or the beginning of October, by a furious easterly wind, with rain and thunder; this is called the Elephanta, which finally closes the rainy season.

The above description of the setting in of the S.W. monsoon at Bombay will do for the whole coast of Konkan and Cánara; but in Malabar, to the south of Pálghát gap, the peninsula becomes narrower, and altered conditions cause a difference in the manner and in the time of the monsoon's approach. In Travancore it commences earlier than on the Konkan coast, the difference in time being frequently 15 or 20 days between Cape Comorin and Bombay. The fair weather sets in proportionally sooner to the southward, where ships may anchor in September in safety, or even in August, if care be taken to lie well out, ready to proceed to sea on the appearance of a gale, though a severe one seldom happens in August or September on the coast to the southward of Mount Dilly, the wind being then much from N.W.

Late in May the S.W. monsoon usually sets in on the southern part of the coast, frequently commencing with a gale from S.E., veering to South and S.W., where it ultimately becomes fixed; at other times it commences with squalls from S.W., and a heavy long swell rolling in upon the shore. This swell is generally the herald of the S.W. monsoon. In June, after the monsoon has set in, the wind keeps mostly between S.W. and W. by S., with severe squalls at times, much rain, and a high sea. In July the weather is nearly the same, becoming a little more settled as the month advances; the squalls veering sometimes to West and W.N.W. The sky is mostly obscured by heavy clouds during these months, precluding observations for several days at a time, but considerable intervals of fine weather have been experienced in some seasons. Ships have left Bombay harbour so late as the 6th or 8th of June, and, with fine weather, passed down the coast without making a tack, the wind prevailing at W.S.W. and West, steady breezes; but such favourable seasons are seldom experienced.

Westward of all the islands the breezes of the S.W. monsoon are strong and steady, while towards the coast of Hindostán they are variable in direction and blow in squalls. It has been remarked that almost all the rain squalls of the Malabar coast, and 200 miles from land, come from the northward of west; they have been experienced from N.W. at a greater distance than 100 miles west of the Konkan coast, in the end of July; and off the Malabar and Travancore coasts, in the beginning of that month, during the night, or early morning, a steamer running a parallel

course to the coast experienced these rain squalls from very nearly North; thus with the wind right aft, and the swell on her beam, she rolled violently.

In August the monsoon does not blow so violently as in the preceding months; the squalls then veer to West and W.N.W., particularly on the southern part of the coast. N.W. and W.N.W. winds are those which prevail in this month near Anjenga and Cape Comorin.

In September the weather becomes more moderate, the Westerly and W.N.W. winds being more prevalent than any other in this month; the squalls now are seldom severe, although the weather is often cloudy and threatening, with heavy showers of rain. A great swell often rolls in from the W.S.W. in this month, particularly during unsettled squally weather, which sometimes happens.

The compiler of this book had opportunities of examining the registers of the wind-gauge at the observatory of Trevandrum (only 3 miles from the sea coast) and of Dodabetta (on the highest peak of the Nilghiri mountains). It was found that, at both places, the wind comes from S.W. for a very few days only, at the commencement of the monsoon; it soon veers more westerly, and by the middle of August is fairly N.W. At the last-named mountain top, the wind becomes N.E. in the latter part of September, or sometimes very early in October.

In the Gulf of Manár, the S.W. monsoon sets in at the middle of May, and is attended with heavy rain, much thunder, and lightning, particularly along the Ceylon shore, where the wind blows right on to the land. Along the Tinavelly coast it has more the character of an along-shore S.W. wind, and is robbed of most of its moisture by the interposing Travancore Ghauts; thus the Indian shore of the Gulf of Manár has to wait till the end of October or beginning of November for its rainy season, while Ceylon has its greatest rain-fall in May, and another, though rather less copious, in October and November; the intermediate months being also rainy, but July and August in a less degree than the others.

June is the month of the S.W. monsoon's greatest force in the Gulf of Manár; in August the strength of the wind abates, but strong Southerly winds are still experienced in this and the following month, becoming lighter as the season advances. These variable and gentle breezes, with smooth water, may be usually expected in October, lasting till the setting in of the N.E. monsoon, in the end of that month or beginning of November, by two or nearly three weeks of heavy rain; this is what is termed the Madras monsoon.

Having thus described the monsoons of Bombay and Malabar, and the coast southwards to the Indian shore of the Gulf of Manár, some description will be given of the winds and weather experienced throughout each

month of the year at localities where the disturbing influence of the lofty mountain chain of the Western Ghauts is not felt. Firstly, at Colombo, on the Ceylon coast; secondly, in the Gulf of Cambay; thirdly, on the Katiawár and Sindh coasts.

WINDS and WEATHER at COLOMBO.—January.—At the opening of the year the N.E. monsoon is at its height; its general effects are parching and disagreeable by day, cold, dry, and cutting at night, when, as the "along-shore wind," it is avoided as injurious to health, and every window is shut against it. Towards the close of the month the wind gets a little Westerly tendency, and occasional showers fall.

February is dry and hot by day, but the nights are cloudless and cool. The wind is unsteady and shifts from N.E. to N.W., sometimes failing entirely between noon and night. Rain is rare; only two inches fall during the whole month.

In March the heat continues to increase. The winds are faint and unsteady, with increasing Westerly tendency; partial showers sometimes fall, and thunder begins to be heard at sunset from the stacked-up clouds amongst the hills; this month has the same amount of rain as the preceding.

April is the most oppressive portion of the year, the mean temperature by day being about 88°. The wind veers between N.W. and S.W. Towards the end of the month a ground swell from the westward proclaims that the S.W. monsoon is not far distant, and the sea breeze towards sunset brings clouds and showers.

May in the commencement is hotter than the last, and the days become more overcast; banks of clouds rise over the ocean and give warning of the approaching monsoon. At last, about the middle of the month, sudden lightnings flash among the hills, and with awful crashes of thunder the S.W. monsoon bursts over the thirsty land in a deluge that, in the course of a few hours, overflows river banks and inundates the plains. Fortunately this violence seldom lasts more than one or two hours, and gradually abates, when a clear sky supervenes; then for some days heavy showers continue to fall at intervals in the forenoon; and the evening sun goes down in great splendour, the wind remaining steadily in the S.W. quarter. In May the greatest monthly rain-fall occurs, viz., from 13 to 14 inches.

In June the S.W. wind gains considerable strength; indeed, this is the most dangerous month for shipping in Colombo roads, on account of the heavy swell that rolls in, though few accidents are said to occur. The fishermen seldom put to sea in this month. The temperature is much reduced by the refreshing influence of the monsoon, the heat being

modified by transient clouds and frequent showers; the rain-fall, however, is only a little more than half that of May.

July (though more boisterous than June near Bombay) is more moderate on the west coast of Ceylon, and showers are less frequent, the amount of rain being only half that of June, and one-fourth that of the month in which the monsoon is ushered in.

August and September are beautiful months, with light westerly breezes, which, towards the close of the latter, begin to get unsteady and to assume a little Northing, and clouds begin to collect. The nights are always clear and cool. September has twice as much rain as August, but not quite so much as June.

October has more unsettled weather, but the sea is smooth, and the wind is not strong, though it veers more to the Northward. There is twice as much rain as in the previous month.

In the early part of November the wind veers between N.N.E. at night and N.W. by day; about the middle of the month the westerly monsoon is completely over, and the N.E. monsoon is ushered in by lightning, thunder, and heavy rain, though the atmospheric disturbance is not so great as that of May. The rain-fall of November is nearly 11 inches, which is half an inch less than is registered in the month of October.

In December the N.E. monsoon is steady and of moderate strength, bringing with it light but frequent rains, the total quantity of which, however, does not amount to half that of November. In this last month of the year, as in the first, the along-shore land wind is dry and cutting, and at night very injurious to those who are so incautious as to sleep in it.

The total rain-fall in the year at Colombo averages 72 inches, about nine-tenths of the quantity that is gauged at Bombay harbour; but that of the Malabar coast, intermediate between those places, is much greater. The rain of Ceylon is more equally distributed than that of India throughout the months of the year, but there are two periods of heaviest rain, the autumnal one corresponding with the Madras monsoon, and the other period, between spring and summer, corresponding with the Bombay monsoon, or rather anticipating it by one month. Of course the west coast of the island presents a contrast with the east, for while the former is drenched, the low country eastward of the mountain region is sometimes exhausted with dryness, but receives its rain subsequently from the N.E. monsoon; in amount, about as much as the Madras coast, or about two-thirds of that which Colombo receives. But in the extreme north of the island the total in the year does not exceed 30 inches.

Water-spouts are frequent along the coast of Ceylon; they do not break over the land, but an instance is recorded of a large boat-load of

Indian coolies, native labourers, being swamped by one on their passage from the continent to the island.

WINDS and WEATHER in the GULF of CAMBAY off SURAT.—In the month of September the winds are generally from S.W. to West, fresh during the first part, and light during the latter part; weather cloudy, with occasional light showers of rain.

In October the winds are very light and variable, but chiefly from North to N.N.E. The weather fine, but the sun very powerful; calms and light airs are generally experienced during the night.

In November the winds are variable from W.N.W. to E.N.E., with hot oppressive weather; during the latter part of the month they become pretty steady from North to N.E., with pleasant cool nights.

In December moderate breezes are chiefly experienced from the Northward, with fine pleasant weather.

In January the winds are mostly from N.N.E. to East, veering occasionally to Northward during the afternoon. Weather delightfully cool and pleasant.

In February the winds are variable from N.W. to N.E., generally light, but occasional fresh breezes are experienced. Weather pleasant and cool.

In March the winds are variable all round the compass, blowing fresh for two and three days at times, but chiefly light throughout the month; weather cool and pleasant, with the exception of a hot wind experienced for a few hours now and then.

In April the winds are fresh from Southward to S.W., with cloudy oppressive weather; but, once or twice during the month, there is a very hard squall from the Westward, which lasts for two or three hours, accompanied by heavy rain.

In May the winds are mostly from S.S.W. to West, blowing strong for several days together, with violent gusts at times, and thick hazy weather, with much thunder and lightning.

June, July, and August are the months of the S.W. monsoon, during which no vessels attempt the navigation of the Gulf of Cambay with its violent tides and intricate channels. Boats run between the east and west coasts, watching their opportunities in short breaks in the weather, but we have no knowledge of the winds except that they blow home to the Surat coast.

WINDS and WEATHER on the COASTS of SINDH and KATIAWÁR.—September.—Winds light from West to South-west; squalls from the land may be expected. The weather is generally hazy, and the monsoon swell not yet subsided.

*October.—Winds West to North-west, light, with occasional calms. Land winds begin to get steady about the latter end of the month. Weather generally very clear and pleasant, but very dense fogs come off the land sometimes. Sea smooth.

November.—Land and sea breezes become steady, veering between West and North-west; the land winds, towards the end of this month, being from one to two days' duration, but not very fresh. Weather generally very clear, and objects visible at a great distance. Much terrestrial refraction prevails during this and the following months, assuming various forms. Upon one occasion the hull of a cutter, only 8 feet out of water, was distinctly seen at 9 miles distance, apparently not more than 4 miles, and the flash of her gun was plainly seen with the naked eye; sounds are also conveyed very distinctly.

December.—Steady land and sea breezes between N.N.W. and N.E. The North-easters on the coast of Sindh and Kutch now blow strong for 3 or 4 days at a time, but with less force and shorter duration on the Katiawár coast. Southerly winds are rare; but when they do occur, it is generally after a strong North-easter, and then they are very light. The weather is now cool and pleasant, with a remarkably clear atmosphere.

January.—Winds continue much the same as in last month; sea breezes veering more to the South-west. Squally weather with rain sometimes occurs near Karáchi.

February.—Winds become more variable, the North-easters less frequent and of short duration; sea breezes between W.S.W. and W.N.W., and towards the end of the month you may get a hard blow from the Westward for two and three days, particularly on the northern part of the coast. A heavy sea always accompanies these breezes, and renders the anchorage off Karáchi harbour very unsafe.

March.—Land winds become less regular; sea breezes are more durable and generally moderate between West and North-west, but blow very hard at times, with thick misty weather.

April.—Winds much the same as last month, weather generally hazy, with a very damp atmosphere. Swell from the westward at times.

May.—Winds moderate from West to W.S.W., weather hazy, with very heavy dews. Clouds begin to gather and much swell prevails from the westward at times.

June, July, and August.—The S.W. monsoon prevails, blowing moderate and fresh breezes between West and South-west, with passing clouds and hazy weather. It becomes very cloudy as the season advances; rain is uncertain, but may be expected about the latter part of

July, and is generally accompanied by variable winds and thunder storms. A heavy swell prevails during this month of July.

RAIN-FALL.—It has been mentioned that in the south of India the rains prevail for a longer period than in the north. Commencing in May, they continue to be precipitated against the west face of the mountains of Travancore and Malabar until November, when the wind coming from the eastward, (that brings the Madras rainy season after that of Bombay has terminated,) being intercepted by the east face of the southern Ghauts, causes the rainy season of Tanjore, Mádura, Tinavelly, and the whole of the Carnátic, or south-east India.

The west coast of Ceylon has rain in every month, but two periods of maximum amount, one in May, when the sun passes the island in going northward, the other in October and November, coincident with the Madras monsoon. In the whole year the rain-fall at Colombo is 72 inches.

Going northwards up the Malabar coast, we find that, at Cannanore, the average fall throughout the year is 120 inches. At Bombay it is 76 inches; at Kutch Mandavee, only about 12 inches; and still less in Sindh, over whose burning desert the wind passes, damp and cloudy, but dropping scarcely any rain, until it reaches the mountain ranges and vast table-lands to the north and east of the river Indus.

Recent observations have shown that the maximum fall of rain occurs, as might be expected, at the ordinary altitude of the principal layers of rain-cloud, that is, between 3,000 and 5,000 feet above the sea-level, and the amount of rain-fall regularly decreases above this height as the higher regions of the air are attained. The discharge is enormous where, between the above elevations, this sea of vapour impinges upon the cold mass of mountains. At the Mahableshwur hills it amounts annually to 248 inches, sometimes nearly 300; and at the coffee plantations on the west hills of the Nilghiri range, at the same level, it exceeds 200; while at Ooticamund, at 7,300 feet above the sea, it is 60 inches. But, whereas, against the weather face of these mountain walls the precipitation is so great, their lee sides receive but little rain, the average yearly fall on the table-land of the Deccan being about 25 inches.

Northward of the Siádri range the valleys of the Tapti, Nerbudda, and Myhé rivers, trending in an easterly direction, invite the rain-clouds which the S.W. monsoon brings into the Gulf of Cambay, and in July and August they discharge an immense body of fresh water; so do, in a minor degree, all the west coast rivers. To this fresh water, borne by the south-east current down the coast for 4 or 5 months of the year, may be attributed the absence of coral along the sea-board from Cambay to Comorin. Fresh water is antagonistic to the growth of coral, and so,

along the west coast of Katiawár, we find little breaks in the fringing coral reefs here and there where little fresh streams drain the country once a year at the rainy season.

When the rain-clouds of the S.W. monsoon approach the arid plains of Sindh and Kutch, they appear to ascend and become absorbed by the air, passing on to precipitate themselves on the mountains to the north-east, and this rain following upon the melting of the Himalaya snows, adds to the stream of the river Indus, and prolongs till September the floods of that great river, which, commencing to rise in the end of March, has attained its maximum height about the beginning of August.

CLIMATE.—The hot season in Malabar is from March to the end of May, during which the thermometer ranges between 80° and 90° in the shade; in the rainy season from 75° to 85°; and in December and January, the coolest season, between 68° and 80°. Amongst the Lakadivh islands—away from the influence which the continent of India has in cooling the air at night, and raising the temperature in the day—we* found the thermometer in the vessel's cabin to remain between 80° by night, and 83° in the day, from December to March inclusive. At Bombay the temperature is much the same as off Malabar. Off the Kutch and Sindh coasts, the coldest period noticed was the last week in January and the first in February, when, in the early morning, the thermometer was observed so low as 50°; in the daytime averaging 65°. It may thus be said that the Malabar coast presents a pleasant and equable temperature to passing vessels. On shore the range of the thermometer is greater; and the heated land on a calm day, before the rainy season, gives the air a rather depressing influence to the European, but the cool sea breeze soon restores him.

The climate of India is, in reality, as various and diversified as the features of the country. In the south, showers are frequent all the year round. On the southern Coromandel coast two months of violent rain occur in winter, the rest of the year being dry; while a few degrees more northerly, on both sides of the Bay of Bengal, and all over Western Hindostán, the converse of this is the case. In central India the rain is extremely light, and occurs mostly about midsummer; in the North there are both summer and winter rains.

In Sindh and Beluchistán there is no rainy season whatever; and the heavy showers, which occur irregularly, and at intervals of years, are productive of sickness and sometimes injurious to the country. It is to the floods of the river Indus, between March and September, that Sindh is indebted for any cultivation. From the day the inundation of the

* *Taptee*, surveying brig, 1848.

river begins to subside, the country becomes unhealthy, and thus the latter week of September and the whole of October are considered the most dangerous seasons of the year. It is then that the change of monsoon takes place, and the exhalations from the swamps are most to be avoided. In December and January the cutting land winds, at Karáchi, stir up clouds of fine desert dust, which the casual opening of a door admits into every hole and corner of the houses, and the sand plainly shows itself in every dish of food.

The land winds of the whole coast, below the Western Ghauts from Bombay to Comorin, are sharp, cutting, and excessively dry, so as to be unhealthy to sleep in during November, December, January, and February. Towards the time of the S.W. monsoon's approach, the air is, at times, so saturated with moisture as to throw a complete haze over the low land and distant hills ; this haze is seen to be restricted to the space between the Ghauts and the sea by the fact of its clearing away after falls of rain, when the distant mountains become again visible and clear.

FOGS.—On the coasts of Sindh and Kutch, and in the latter gulf, dense banks of fog sometimes come off the land in October, and in January and February, after a calm night ; they drift to seaward with the land winds, and back again with the sea breezes, until the heat of the day disperses them. In some places, on the west coast below Bombay, there are the same fogs in October, but in a much less degree, and they only obscure the low land and projecting headlands about sunrise and a little after. The Western Ghauts are enveloped by dense mists, or haze, from April to November, which disperse occasionally for short intervals after heavy falls of rain ; in the actual S.W. monsoon the atmosphere is so dense as completely to hide the mountains from view.

In the season of N.W. winds off Bombay, and along the coast to the southward, the atmosphere is generally hazy, particularly in March and April ; and, through this haze, the land and trees along the coast appear to be twice the distance they really are. This is especially the case during the S.W. monsoon.

VARIATION of COMPASS.—As the magnetic meridian runs so closely along the entire western shore of Hindostán, there is, practically, no variation of the needle ; the amount averages only a quarter of a degree, and scarcely needs to be taken into account by the navigator when he sets the land, so that his magnetic bearings may be laid down on the chart as true ; and the liability of applying the variation the wrong way (a mistake which sometimes seriously affects the vessel's position) is thus obviated.

In the Gulf of Manár between Tuticorin and Colombo, the variation averages one degree, easterly.

REMARKS ON MAKING PASSAGES.

WORKING up the COAST.—At the present time no vessels attempt the passage up the coast after May, until September is considerably advanced. It is, however, remarkable, and evinced great nautical skill and perseverance amongst the English navigators of early times, that some of them effected a passage up the Malabar coast nearly in the face of the S.W. monsoon. The ship *Bengal Merchant* from England, on the 17th July 1686, made the coast at Anjenga, anchored in 19 fathoms off Quilon on the 20th, and remained there some time. On the 14th August she moored at Calicut; left it on the 19th, passed Mount Dilly on the 23rd, and arrived at Bombay harbour on the 7th September. These dates are supposed to be those of the old style, or 11 days later than the present calculation.

The passage to the northward, in September and October, is rendered very tedious by adverse winds and currents on the southern part of the coast. In the middle and end of September, about Anjenga, the winds are at N.W., and variable with frequent light airs, and a constant strong current to the southward. This obliges vessels to anchor frequently, when the breezes fail, to prevent being driven back by the current. The weather is threatening at times, with heavy showers, and some light squalls from the sea, which produce a considerable swell, setting in upon the shore.

Ships from England, Cape of Good Hope, Mauritius, or any other part, coming the southern passage, bound for Bombay, which cannot cross the line to the westward of longitude 60° or 62° East, before the beginning of October, should, if the wind permits, pass through the 9 degrees channel, and steer to the northward of East, until soundings be obtained on the coast of Malabar, at a depth of 40 or 50 fathoms water, mud bottom, and then haul to the northward and work up near the shore with the aid of the land and sea winds; the former commence about the beginning of October below Calicut, but do not extend far off shore until November. This route, however, will be found preferable to working up to the westward of the Lakadivh islands and shoals, where the winds are, at that same period, generally light and variable from the northward.

In December, January, and February the regular sea breezes render navigation northwards very easy and pleasant; the sea is remarkably smooth near the coast, the sea breeze of course strongest near the shore, so that a vessel should keep in sight of the coast.

Ships bound to the northward, in March and April, will probably experience land breezes between Anjenga and Calicut, but to the northward of Mount Dilly these will generally fail in strength and duration. Ships ought therefore, particularly in April, to be well out in 35 or 40 fathoms,

about noon, that they may be enabled to make a long stretch to the N.N.E. and N.-eastward with the N.W. winds. If they get in shore early in the evening, and the wind be at N.W., it will be proper to make short tacks near the land until the breeze veers to the Northward, which may be expected in the early part of the night; they ought then to stretch off to the N.W. or W.N.W., to be ready for the sea breeze of the following day, as there will probably be no breeze of any consequence from the land. If the wind continue brisk, a ship will generally gain ground or hold her own during the night; but if, after a Northwester, it falls to little wind, with a chopping sea and a drain of current setting to the southward, she ought to anchor with a kedge or stream to prevent losing ground.

Late in March, or in April, when a strong Northwester sets in, it is liable to continue 2 or 3 days, or longer, rendering it impossible for a ship to gain any ground, when working near the coast. At such times it is advisable to stand out to sea about 60 miles or more, where these winds are generally moderate and the sea smooth, which will enable her to gain ground and make a better passage to Bombay than by persevering to work against the chopping sea and drain of adverse current which generally prevail near the shore when the Northwesters blow strong.

In April, the weather becomes hazy, and at times cloudy over the land in the evening, with light showers. In this month, the passage up the coast is very tedious, owing to the strong Northwesters. In some years, however, strong Southerly winds have been known to blow along the whole extent of the coast in April, which continued for several days. Ships have been known to sail from ports to the southward, at the commencement of these Southerly winds, which carried them to Bombay in 5 or 6 days; but such instances are uncommon, for Southerly winds seldom happen in April, except such gales as are mentioned under that section, at page 11.

When a ship, bound to Bombay, is on the southern part of the coast, late in April or May, if the wind be favourable with steady weather, she may steer to the northward, keeping a good offing towards the Lakadivh islands. Being clear to the northward of these islands, she ought, if the weather is unsettled and cloudy, with variable winds, to endeavour to obtain a greater offing, in order to have good sea room in case a gale should happen. If the weather is favourable, an equal advantage will be obtained when she is between one and two hundred miles from the land, as the sea is there more smooth for working than in-shore, where a short chopping sea usually prevails, and a drain of current setting to the southward during strong N.W. winds.

If a ship be on the southern part of the coast below Mount Dilly in

May, and meet with N.W. winds, she ought to stretch off without loss of time to the westward of the islands by passing to the southward of Seuheli-par, between it and Minicoy, (*see page* 282), or through any of the Lakadivh islands; she will there be ready to benefit by the approaching Westerly winds, or to take every advantage of the shifts should they continue from N.W. and Northward. Many of the small coasting vessels make excellent passages up the coast at this season; but the natives have an advantage in a thorough knowledge of the coast winds and tides, and, in case of urgent necessity, have so many little rivers and ports to run into.

BOMBAY to DIU and KARÁCHI.—As Diu head and the mountains inland of it are the only landmarks on the south coast of Katiawár that the navigator wishes to sight, when bound from Bombay to any ports westward and northward of Diu, it will be well to give here a few general directions for the passage from Bombay to Diu head, according to the season.

In September, when the remains of the S.W. monsoon swell will still be felt, and in October, (which two are the months of light variable winds between the monsoons) North-west winds are general, and there will be no advantage in keeping near the Indian coast much to the north of Bombay, but a nearly direct course from Basseen towards Jáfrabad should be made.

November is a very calm month along the south coast of Katiawár, and, if proceeding to the westward, a ship should anchor on the flood to avoid being swept into the Gulf of Cambay.

After the above months, and throughout the N.E. monsoon—November, December, January, and February,—a ship should work with the land and sea breezes up the coast above Bombay, and sight Sunján high land before starting across to Diu head, as the wind generally hangs much to the Northward and N.N.E. across the mouth of the Gulf of Cambay.

In March and April, when Northwesters prevail on the coast of India, and the land wind is light and uncertain, little is gained by keeping in with the land, but a nearly direct course should be taken from Salsette to Diu, remembering the set of the tides, and taking advantage of the shifts of wind to make northing.

By attention to the soundings and the chart, the navigator may easily know his position, and avoid being swept into the gulf; for Southerly winds often happen at Surat, and on the Malaiki banks, after the middle of April and early in May, frequently blowing fresh during the springs, particularly during the night with the flood tide, and producing a considerable sea.

In May and early in June, on leaving Bombay, every slant of wind should be profited by to make westing, so as to be able, when the S.W. monsoon fairly begins, to weather Diu head, by 100 miles if bound into the Gulf of Kutch, or by 200 miles if for Karáchi. The Kutch boats, called kótias, after delivering their last cargoes of cotton at Bombay in the end of May, frequently manage a passage from Bombay to Kutch Mandavee in 6 or 7 days, profiting by a thorough knowledge of the tides of the Gulf of Cambay, and knowing well how to make the young S.W. monsoon a leading wind along the whole west coast of Katiawár.

In the first part of the S.W. monsoon, there is a strong drain of current into the Gulf of Kutch, which, without nullifying the ebb stream, makes that of the flood very much more swift; for the sea water is then propelled by the Westerly wind many miles over the Runn, causing that level plain, at that season, to be a vast inland sea, traversable by boats, instead of beasts of burthen, as in the opposite season.

During the S.W. monsoon, vessels bound to Karáchi should be careful not to make the coasts of Sindh or Kutch below their port, partly because there is a set to the south-east, and partly because the wind is liable to lull occasionally; for it has been observed that the monsoon does not always blow home to the coast, so that, with a heavy swell and lee current, they might have to bear up for Bombay again.

PASSAGE down the COAST.—Ships from Karáchi, bound southwards along the coast of India, have favourable winds almost all the year round, and need only to be reminded of the indraught into the Gulf of Kutch from March to September; they should therefore give a wide berth to the shoals at the entrance to that gulf.

If leaving Karáchi in the S.W. monsoon, a vessel, so soon as clear of the bar, should work off to the south-west into 15 or 20 fathoms water before shaping a course to the southward. In passing the Munneja bank, she should not be in less than 20 fathoms, and never decrease that depth along the Katiawár coast. If bound to Bombay, it is well to know that nearly a straight line from Diu head to the offing by Bombay is the 20 fathoms line: so that a vessel, by her lead and soundings alone, will make Bombay from the northward by simply keeping in the 20 fathoms line.

Ships, bound round Cape Comorin, sail from Bombay, or any port on the west coast of Hindostán, in every month of the year, and may keep at any convenient distance, giving attention to the few outlying dangers which are noticed in the body of this work at page 5; only, in the first part of the S.W. monsoon, they should get into 50 fathoms off Bombay, if the wind hangs much at S.W., before running down the coast.

Directions for working out of Bombay harbour are given in the chapter about that place; it is therefore only necessary to premise that ships,

passing along the edge of the bank of soundings in the strength of the S.W. monsoon, should be always prepared for stormy weather, because the squalls are often of long continuance, and very severe: at other times, fine weather may be experienced, with intervals of light breezes. Late in June some ships, in 45 and 50 fathoms water, have been unable to make any progress to the southward, for several days together, by the wind blowing in severe squalls from S.W. with a high sea: others, with indifferent sails bent, after splitting them, have been nearly driven ashore, and two fine ships were really driven on it and wrecked several years ago. By carrying a press of sail, during the squalls, many ships have lost a lower yard or topmast; it is therefore prudent, when the weather seems to be setting in severe, for a large ship to make snug by taking a reef in her courses.

It may be well here to remind the navigator that, in running down the Malabar coast, the projecting points are Viziadroog, Vingorla rocks, Pigeon island, Mount Dilly, Sacrifice rock, Alipee, Quilon reef, Ruttera, and Cadiapatam (off which lies the Crocodile rock).

It may be noticed that off Bombay and Thull the 30 fathoms line is 25 miles from the land, whereas off Choul and Angenwil that depth of water is 40 miles from the shore. Off Viziadroog again, 30 fathoms is found at the distance of 16 miles, off Pigeon island at 30 miles from the mainland, and off Mangalore at 20 miles.

From Mount Dilly southwards the bank of soundings does not extend so far off shore as near Bombay; the following statement of the depths off particular places, may be useful to vessels running down the coast.

Off Vingorla rocks (which are in the line of 15 fathoms), the depth of 20 fathoms is found at 4 miles from them; and 30 fathoms at 12 miles.

Pigeon island (which is in the line of 17 fathoms) has 20 fathoms one mile outside of it; 30 fathoms at 20 miles; and the edge of the bank at 60 miles.

Off Mount Dilly.—10 fathoms at 3 miles; 20 fathoms at 8 miles; 30 fathoms at 14 miles; and the edge of the bank at 40 miles.

Off Cotta point.—10 fathoms at 3 miles; 20 fathoms at 8 miles; 30 fathoms at 25 miles; and the edge of the bank at 40 miles.

Off Ponány.—10 fathoms at 5 miles; 20 fathoms at 11 miles; 30 fathoms at 18 miles; and the edge of the bank at 30 miles.

Off Alipee.—10 fathoms at 8 miles; 20 fathoms at 12 miles; 30 fathoms at 18 miles; and the edge of the bank at 30 miles.

Off Quilon.—10 fathoms is in foul ground, 3 miles from the point; 20 fathoms at 5 miles; 30 fathoms at 14 miles; and the edge of the bank at 28 miles.

Off Ruttera.—10 fathoms half a mile from the coast; 20 fathoms at 2 miles; 30 fathoms at 7 or 8 miles; and the edge of the bank at 26 miles.

Off Cadiapatam.—The line of 10 fathoms is by the rocky islets of Kotah and Adumdah; the Crocodile rock is in the line of 16 fathoms, and 20 fathoms is found very close to it; 30 fathoms at 13 miles from the main land; and the edge of the bank at 37 miles.

Off Comorin.—The edge of the bank of soundings extends in a radius of 55 miles to the south-west and south.

From Bombay harbour to Viziadroog, the direction of the coast is S. by E., the latter being a projecting part of the land; onwards to Vingorla rocks, it is the same line of bearing; afterwards its general direction is S.S.E. to Mount Dilly and Quilon, (the coast between these two latter places forming a considerable bight, as also it does between Vingorla rocks and Mount Dilly,) and from Quilon more easterly to Cape Comorin. The best track, after getting an offing, is to keep on the edge of the bank of soundings in from 40 to 50 fathoms; more particularly in June and July it is prudent to keep well out from the coast.

It is of little consequence whether a ship get out of soundings or not, until she approaches the head of the Lakadivh islands; but, after reaching latitude 12½° or 13° N., care must be taken to obtain soundings, if not certain of your position by chronometer, that you may be able to shape a course to pass inside of Elicalpéni bank. This bank lies in latitude 11° 16′ North, having only 6 or 7 fathoms water, rocky bottom, in some places, and so little a depth as 3¾ fathoms has been reported, though doubtful, and it is distant from Mount Dilly about 80 miles. A large ship would probably strike on it when the sea runs high in the S.W. monsoon, it ought therefore to be avoided. About midway between Mount Dilly and this rocky bank, there are soundings of 65 and 70 fathoms, but a little further out no ground.

As you proceed to the southward, the wind will generally become more favourable, veering to W. and W.N.W., with a current setting southward at the rate of 15 or 20 miles daily, and sometimes stronger. On the southern part of the coast, between Cochin and Cape Comorin, the southerly currents and W.N.W. winds prevail greatly during part of July, August, September, and part of October.

Having entered the channel between the Lakadivh islands and the coast, continue to steer along on the edge of soundings, or should you get off the bank it is of no consequence, as the soundings do not extend so far from the coast to the southward of Calicut as they do farther to the northward. The land may also be approached with greater safety, the squalls being less severe and the wind more favourable; but it is

still advisable not to come under 30 fathoms unless you are to touch at some place on the coast. This ought to be done with caution, for a ship, intending to stop at any port of this coast, except Alipee, in the S.W. monsoon, should anchor a great way out, prepared at all times to put to sea on the appearance of threatening weather.

If you get observations for latitude and longitude, in proceeding from Bombay to the southward, and your distance from the land be correctly ascertained, it will seldom be requisite to sound, particularly when you have passed Elicalpéni bank. You may then steer about S.S.E., and S. by E. ½ E., as circumstances require, keeping from 20 to 30 miles from the coast, in the early part of the monsoon, until you are abreast of Cape Comorin; but, in steady settled weather in August, it may be approached within 10 or 15 miles at discretion.

When abreast of Quilon, the coast takes a direction more to the S.E., and you may from thence shape a course for the south end of Ceylon, taking care to allow for an easterly current which sometimes sets into the Gulf of Manár. The *Gunjavar*, crossing from Cape Comorin, in August, bound to China, experienced a current setting into the gulf, and, having steered mostly S.E. by E., she sighted the Haycock (a hill 20 miles to the northward of Point-de-Galle) bearing E. by N. ½ N. at daylight; as there was little wind with a heavy swell, she was obliged to anchor in 34 fathoms, about 4 or 5 miles off shore; shortly after, squally weather set in from S.S.W., which forced her to carry a press of sail, whereby she broke some of her chain-plates, twisted the head of her mainmast, and was four days beating round Point-de-Galle, sometimes under close reefed topsails.

The East India Company's ships, however, often got into the Gulf of Manár by mistake, above a century ago, and seldom experienced difficulty in escaping from it. The journals of other vessels show that the winds along the south-west side of Ceylon, in the end of July, were much the same as experienced by the *Gunjavar* in August, namely, between S.W. and South.

CHAPTER II.

GULF OF MANÁR.—POINT DE GALLE TO CAPE COMORIN.

VARIATION OF COMPASS, 1° 0′ E. in 1865.

THE Gulf of Manár is formed by the coasts of Tinavelly and Mádura on the west; the ledge of rocks and islands, called Adam's Bridge, on the north; and Ceylon on the east. The extreme breadth from Point de Galle to Cape Comorin is 200 miles.

The WEST COAST of CEYLON is low near the sea, much planted with cocoa-nut and other trees. Inland, the mountains attain a great elevation; Adam's Peak (the loftiest visible from the west coast) stands 7,420 feet above sea-level, but, being 35 miles from the nearest sea, is veiled in haze during the S.W. monsoon, though an excellent landmark for two-thirds of the year. The culminating peak, however, of Ceylon is Pedrotála-gála, 860 feet higher than Adam's Peak, and nearly 20 miles further north-eastward. Between Galle and Colombo much elevated country intervenes between Adam's Peak and the coast; the most useful marks are the Haycock, and the Hummocks or Knuckles, which, with any other conspicuous hills, will be described under their contiguous ports. North of Colombo, the country gets lower and lower towards the north end of the island; estuaries of great area, called after ancient Arab navigators "gobbs" (ghubbet), separating large tracts of low land from the main, are the peculiar feature of the northern part of this west coast of Ceylon.

A peculiarity, which is one of the first to strike a stranger who lands at Galle or Colombo, is the bright red colour of the streets and roads, contrasting vividly with the verdure of the trees; and the ubiquity of the fine red dust which penetrates every crevice and imparts its own tint to every neglected article. Natives, resident in these localities, are easily recognisable elsewhere, by the general hue of their dress. This is occasioned by the prevalence, along this western coast, of *laterite*, or, as the Singhalese call it, *cabook*, a product of disintegrated gneiss, which, being subjected to detrition, communicates its hue to the soil. Along this west coast, from Point de Galle to Chilaw, breccia is found near the shores, from the agglutination of corallines and shells mixed with sand, and the disintegrated particles of gneiss. But the principal scene of the most recent formations is the extreme north of the island, with the adjoining

peninsula of Jafna. Here the coral rocks abound far above high-water mark, and extend across the island, where the land has been gradually upraised, from the eastern to the western shore. Sand covers a vast extent of the northern seaboard, the peninsula of Jafna, and Manár island; this is doubtless brought by the currents of the N.E. monsoon from the Coromandel coast, and from the Mádura shore in the S.W. monsoon across the shallows of Adam's Bridge; this barrier being formed by a long line of sandy embankments which shift about materially through the force of the ocean swell in opposite monsoons.

Rivers.—Nine or ten streams of some magnitude, besides smaller ones, fall into the sea between Point de Galle and Manár. The Gindura near the first-named place; next northward comes the Bentotte river; then the Kalu-ganga, or Kalu-oya at Caltura; the Kalani-ganga, or Mutwal at Colombo; the Maha-oya, or Kaymel near Negombo; and the Dedru-oya at Chilaw. The Veluki-ár falls into the Putlam backwater, running northward to the ocean round the north end of Calpentyn island, whereabouts also is the mouth of the Kala-oya, debouching into the sea at Dutch bay. Further northward are the Moderegam, and the Arive-ar or Aripo river.

All these streams are liable, during the fury of the monsoons, to be surcharged with rain till they overflow their banks, and spread in wide inundations over the level country. On the subsidence of these waters, the intense heat of the sun, acting on the surface they have deserted, produces a noxious and fatal malaria, prolific of fevers; and, in some seasons, so deadly is the pestilence that the Malabar coolies, as well as the native peasantry, betake themselves to flight.

Very few of the rivers of Ceylon are navigable, and these only by canoes and flat boats, which ascend some of the largest for short distances. Those which intersect the great high road from Point de Galle to Colombo are mostly bridged; a bridge of boats connects each side of the Kalani-ganga near the latter place.

The MÁDURA COAST.—From the Paumben pass to Vaimbaur, about 50 miles, is an extensive sandy plain, without a single hill or conspicuous eminence. The Vygah, the principal river of the province, falls into Palk's straits just to the north of Tonitorai, the headland which forms the west side of Paumben pass. The other rivers are numerous but smaller, and, though destitute of water in the dry season, have considerable volumes during the rains, and must naturally bring down much of the alluvial deposit which tends gradually to fill up Palk's straits.

The soil of Mádura, in the vicinity of the sea, is generally sandy; but, in the interior, black and fertile, and well suited for the growth of cotton,

which is the principal commercial crop. The roads in the district of Ramnád, which comprehends the south-east coast and the headland of Tonitorai, are not good, but mere tracks in the sand, sometimes not very practicable for wheeled carriages.

The TINAVELLY COAST is about 85 miles in length; the portion northward of Tuticorin is, like that of Mádura, low, with cocoa-nut trees fringing it; scarcely any rising ground occurs inland till southward of that harbour at the back of Manápaud point; but the magnificent ghauts, which, running northwards from Comorin, are the boundary between Tinavelly and Travancore states, form a background, in clear weather, to the otherwise monotonous landscape. Towards Comorin, the ghauts are much nearer to the shore and always visible.

Between Manápaud and Comorin the coast is higher than the rest, rising to elevations of upwards of 100 feet in undulating sandy hills; the background is mostly red soil, covered with palmyra palms and bushes, and rising gradually to the foot of the ghauts. Numerous fishing villages and small white-washed churches line the coast, but there are no prominent points affording shelter, and landing in a ship's boats is at all times a difficult and dangerous operation.

Tinavelly has several minor streams, but only two principal rivers, the Tambaravári or Tambapáni, and the Vypúr, falling into the sea, the latter 16 miles to the northward of Tuticorin, the former about half that distance to the southward. In the rainy season, the numerous feeders of these two, and other rivers, lay the country in many parts under water, and leave everywhere in the plains innumerable small lakes or ponds. That part of the province to the north of the river Tambaravári is the more level and fertile and very productive, being extensively irrigated by canals from that river. The south-east part of Tinavelly is, however, barren, having a light stony soil; that throughout the province is generally of a deep red or rusty colour, from the presence of iron, and contains a large quantity of sand, forming a friable mould. In the maritime tract on the south-east coast, there are extensive salt marshes, liable to spread greatly during the rainy season. Of all the products of Tinavelly, cotton is the most important; but the cultivation is restricted to the native plant of India. Rice is the principal alimentary crop, but it sometimes fails to a considerable extent when the rain-fall is below the usual average. Pearl banks exist in the shallow sea both northward and southward of Tuticorin, but do not produce so great a revenue as those off Ceylon.

SOUNDINGS.—Off the south-west coast of Ceylon, the bank of soundings extends nowhere so much as 15 miles; to the northward of Colombo, only about 10 miles; but to less than half that distance off

Calpentyn and Kara-tivo. From the latter place the edge of the bank trends north-west towards Paumben, and at 15 miles south of that town there is no bottom at 100 fathoms. It is to be regretted that the continuation of the bank, off the Tinavelly coast to Comorin, has not yet been examined; thus its outer edge cannot be correctly defined, but due south of Comorin it stretches 45 miles off shore.

The PEARL BANKS of the Ceylon coast extend several miles to the west and south of Manár island, but are not specially depicted on the charts; many of those, however, of the Tinavelly coast between Paumben and Trichendore are laid down. More care than formerly has of late been bestowed upon the pearl oysters of the Gulf of Manár; they occasionally disappear from banks where many an annual harvest has been reaped, and this disappearance is now known to be owing to the recently-ascertained fact that they migrate at times to more favourable situations, for which purpose the oyster can sever its byssus, and re-form it at pleasure; thus it not only possesses locomotive powers, but their exercise is indispensable to its economy when obliged to search for food, or compelled to escape from local impurities. It is also susceptible of translation from place to place, and thus new beds are formed in positions ascertained to be suitable for its growth and protection.

The pearl-divers are chiefly Tamils and Moors, who are trained for the service by diving for *chanks*,—a shell that is used by the people of India to be sawn into bangles and anklets, which is not only fished up by the divers off the islands of Manár and Kara-tivo, but dug up in large quantities from beneath the soil on the adjacent shores, in which they are deeply imbedded, the land having evidently been since upraised. The pieces of apparatus employed to assist the diver in his operations are exceedingly simple in their character: they consist merely of a stone, about 30 pounds weight, to accelerate the rapidity of his descent, this is suspended over the side of the boat, with a loop attached to it for receiving the man's foot; and of a net-work basket, which he takes down to the bottom, and, throwing himself on his face, fills with the oysters as he collects them; this, on a concerted signal, is hauled to the surface. The divers do not ordinarily remain a full minute below, and the most expert cannot continue at the bottom so much as 90 seconds, nor attain a greater depth than 13 fathoms in the pursuit of their calling. The Gulf of Manár abounds with sharks, but, strange to say, not more than one well authenticated accident is known to have occurred from these creatures during any pearl fishery since the British have had possession of Ceylon.

SOUTH-WEST COAST OF CEYLON.

OONAWATTY POINT.—This point, the extreme south-east headland of Point de Galle harbour, is rocky, rather high, and conspicuous to a vessel

coming from the eastward, rising as it does from the sea to an elevation of more than 200 feet at the site of Edward's pillar, a landmark about 50 feet high, which stands about one mile north of the point, and nearly one mile and three-quarters E. by S. of the lighthouse. To the eastward of this point the land is formed of several ridges of hills of various aspects, and is higher than that to the westward of Point de Galle, where it is generally low, with cocoa-nut trees fronting the sea.

BELLOWS ROCK.—This is the outermost of a chain of rocks which lie nearly three-quarters of a mile S.S.E. ½ E. from Oonawatty point, thus making that steep rocky side of Point de Galle bay a lee-shore in the S.W. monsoon, when the current runs so strongly to the eastward along the south coast of Ceylon, rendering it unpleasant to anchor in the road. On the Bellows the sea always breaks, and very high in bad weather.

POINT de GALLE BAY is formed between Point de Galle and the sloping land to the eastward, on the highest part of which, at an elevation of 264 feet, stands Edwards pillar, painted white; from thence the land trends to the south-east, and terminates in Oonawatty point.*

The inner part of the bay is between Point de Galle, which is low, and a rocky bluff to the eastward, named Watering point, which has a natural red patch on the slope of its western face. The distance between the two points is a little more than a mile in an E. by S. ½ S. direction, but the actual entrance is narrowed, and the anchorage within much confined, by numerous dangerous reefs, having only from 3 to 15 feet water, over them. The head of the bay is a low sandy beach, bordered with cocoa-nut trees, and near its centre are two rocky promontories, known as Gibbet island and Glosenburg.

The present anchorage frequented by shipping is in 6 to 4 fathoms, sandy bottom, on the western side of the bay abreast the fort, where supplies of every kind may be procured; but the space is too limited to accommodate the yearly increasing number of vessels visiting this port.

The land in the vicinity of Point de Galle is comparatively low and ill defined; but the position of the bay may be readily known by the lighthouse which stands at the southern extremity of the western point of entrance. On this point the fort and town are built, the sea front being rendered inaccessible by a line of coral reefs, on which the sea breaks heavily.

Extending a quarter of a mile to the southward from the lighthouse point are several rocky islets, on one of which, Pigeon island, stands a

* *See* Chart of South Coast of Ceylon, No. 813; scale $m = 0{\cdot}25$ of an inch; and Plan of Point de Galle Bay, No. 820; scale $m = 12$ inches.

solitary cocoa-nut tree (1860). These dangers are all above water, and therefore easily avoided.

Supplies.—This bay is now much frequented as a port of call for orders, in consequence of the Electric Telegraph, which is in communication with every part of India. Supplies of every kind, including coal, can be obtained. Native boats and crews can be hired, to supply ships with water, which may be procured from a small bay within Watering point, where there is an excellent spring, and a wooden pier.

LIGHT.—A *fixed white* light is exhibited from an iron tower, 80 feet high and painted white, on the south bastion of the fort of Point de Galle; the light is elevated 100 feet above the sea level, and is visible in clear weather at a distance of 12 miles; latitude 6° 1′ 25″ N., and longitude 80° 12′ 32″ E.

OFF LYING DANGERS.—The Cadda Rocks consist of a series of disconnected patches, nearly 2 cables in extent, N. by E. and S. by W., with 2 fathoms on the shoalest part. There is deep water between the rocks. During the S.W. monsoon, heavy breakers extend the whole length of the reef; but in the N.E. monsoon there is seldom a break.

The Outer Cadda, on which the least water is 13 feet, lies S. ½ E. about two-thirds of a mile from the lighthouse, with the Pilot's tree * and Sailor's bastion in line, and the white mark on the eastern side of the bay almost shut in with Watering point.

The Middle Cadda, with 2 fathoms on it, lies with the Pilot's tree open of the almond tree, and the white mark a sail's breadth open of Watering point.

The Inner Cadda has 15 feet on its shoalest part, from which the Pilot's tree is in line with Flat rock, and the signal-staff on Neptune's bastion is open east of the cocoa-nut tree on Pigeon island.

Para Rock, having 5 fathoms over it, never breaks. From it the lighthouse and east end of Elephant rock are in line; and the white mark is shut in with Watering point.

Meemattia Rock is half a cable in extent, has 17 feet on it, and breaks in bad weather during the S.W. monsoon. It lies nearly in mid-channel, between the Inner Cadda, and the islets extending south of the lighthouse; from it the east turret of the church in the fort is seen touching the west side of Elephant rock, and Flat rock is in line with Cutcherry police station.

DANGERS IN BAY.—Polcatte Rock has only 3 feet on it, and always breaks. The marks for it are, the lighthouse open south of Flat

* This tree stands on Moodliar hill, and forms one of the most important leading marks into the bay. It is large and mushroom shaped, but being almost hidden by the growth of trees in its neighbourhood, it has been recommended that these latter be removed, that this valuable mark may be more easily recognized.

rock, and the Button rock on with the left high shoulder of Moodliar hill. A *black* buoy is placed in 6¾ fathoms, about 30 yards E.S.E. of the rock.

Mata-Mada Rocks form two distinct patches about three-quarters of a cable apart, and always break. A *red* buoy is placed in 6 fathoms about 30 yards West of the inner and shoalest patch of 6 feet, from which the white gabled chapel, on an eminence outside the fortifications, is just open of Schwarte fort, and the cocoa-nut tree on Pigeon island is on with the north end of Flat rock.

Bellicatua Rock with 2½ fathoms on it, forms with the inner Mata-mada patch, distant 1½ cables in an E. by N. direction, the narrowest part of the entrance to the western portion of the bay. This rock breaks in bad weather during the S.W. monsoon, and the marks for it are, the Pilot's tree just open eastward of the Gull rock, and the cocoa-nut tree on Pigeon island on with north end of Flat rock.

Wara Rocks always break, having only 3 feet on their shoalest part, from which the Pilot's tree is in line with the Arrack store; and the church in the fort is on with the almond tree.

Kapera Rock, on the west side of the bay, has on it a shoal patch of only 9 feet water, from which the cocoa-nut tree on Pigeon island is on with the centre of Elephant rock, and the Sun bastion is touching the end of Schwarte fort. A *black* buoy is moored in 5 fathoms at a third of a cable E. by N. from the 9 feet patch.

Cata Rocks consist of a long ledge, extending in a southerly direction from near the west end of Gibbet island, towards the Wara rocks. There are several detached patches on the ledge, with 1 to 3 fathoms on them, and deep water around. From the westernmost patch of 2 fathoms, the garrison flagstaff is on with north end of Schwarte fort, and the light-house is seen over the angle of Utrecht bastion; a *red* buoy is moored in 5¼ fathoms about 80 yards west of this patch.

Avareea Rock, with 4 fathoms on it, lies directly in the channel, midway between the Kapera and Wara rocks, with the lighthouse open of Utrecht bastion, and the Sun bastion on with the rocks of Schwarte fort.

Vellicocco Reef consists of two rocky patches, carrying 3 to 9 feet water. The shoalest part of the northern patch, with only 3 feet on it, is the spot on which the Peninsular and Oriental Company's steamer *Malabar* struck, causing her total loss in May 1860. From it the Pilot's tree is seen just open east of the Gull rock, and Edwards pillar is its own breadth south of the white mark; a *black* buoy is moored in 4 fathoms, East 40 yards from this patch.

Tanna Rock, with 3½ fathoms on it, lies with Pigeon island cocoa-nut tree open of Utrecht bastion, and the Pilot's tree nearly midway between the Arrack store and Alexander's house (a little nearer the former).

The Gull is a small round rock, about 5 feet in diameter, and 3 feet above the sea level, lying in the north-west corner of the bay. There is a large iron ring on its summit, to which native vessels secure their stern hawsers.

Imburynha Rock has 4 fathoms on it and never breaks. It is the southernmost part of a rocky ridge of 5 fathoms, one cable in length north and south, and distant a quarter of a mile in a W.N.W. direction from Watering point, with a general depth of 7 fathoms in the channel between. The marks for it are, the Pilot's tree on with the middle of the Arrack store, and the lighthouse in line with Flat rock.

Deumba-Dava Rock has 12 feet on it, and breaks during the S.W. monsoon. From it the white gabled chapel on an eminence outside the fortifications is just open of Schwarte fort, and Elephant rock is on with south end of Flat rock.

Cabeera Rocks are two patches, half a cable apart, north and south, with 5 and 6 fathoms between. From the northern and shoaler patch in 3 fathoms, the chapel just mentioned is in line with Cowdie high rock, and the church in the fort is open north of the almond tree.

Kette Rock, on which the least water is 15 feet, lies with the belfry just open of Schwarte fort, and the Pilot's tree open its own breadth west of Alexander's house.

Bocolosava Rock is well on the eastern shore of the bay, and distant a quarter of a mile in a N. by E. direction from the nearest part of Watering point. From the least water on it, 3½ fathoms, the church in fort appears open north of the almond tree, and the Cutcherry police station is seen over the neck of Gibbet island.

ANCHORAGE.—During the N.E. monsoon, the best anchorage in the roadstead outside Point de Galle bay is in 16 fathoms, with the Pilot's tree and church in the fort in line, and the rocks off Oonawatty point on with a point to the eastward of Oonawatty. Vessels seldom anchor in the road in the S.W. monsoon, but should they do so, the best temporary anchorage will be in the same depth of water with the lighthouse bearing N.E., and distant about 1½ miles off shore.

TIDES.—The tidal stream does not exercise any perceptible influence in this bay. It is high water, full and change, at 2 hours, and the rise is about 2 feet. The streams are regular, east and west, and their rate rather more than one knot.

DIRECTIONS.—As the approaches to Point de Galle bay are rendered dangerous by numerous sunken reefs, it is essentially necessary that vessels should obtain the services of a pilot. In most cases, the pilot canoe, with flag displayed (white, red, white, horizontal) awaits a ship beyond the limits of the off-lying dangers; but as circumstances may possibly compel a vessel to seek a place of refuge when the heavy sea precludes the possi-

bility of a boat leaving the bay, the following directions, if closely attended to, will lead into safety.

During the N.E. monsoon, from December to March (inclusive), the bay is at all times accessible, and an anchorage can be obtained with facility; for a sea breeze varying from S.S.E. to West generally prevails during some part of each day. Early in the morning, the wind is generally off the land from the northward, and enables vessels to leave the bay.

During the S.W. monsoon, from April to November (inclusive), though the wind frequently veers round even to the northward of West, there is generally a heavy swell setting directly into the mouth of the bay from the southward; this sometimes occasions much difficulty in bringing a vessel up in an anchorage already so over-crowded as to compel vessels to be moored by means of stern hawsers, which, if required, are supplied by the local authorities.

A vessel approaching the bay from the westward with Point de Galle lighthouse bearing E. by N. ½ N., will pass clear to the southward of the Whale and Little Whale rocks; both of which are nearly in the same line of bearing, about W. ⅛ N., from the lighthouse; the former being distant 2½ miles, the latter about 1¼ miles.

The rocky islets off the lighthouse may be approached in safety so long as the church in the fort is kept westward of the lighthouse; here the pilot's boat will generally be found.

To pass north of the Cadda rocks, keep the white mark on the east side of the harbour well open of Watering point; or Edwards pillar on with a natural red patch on Watering point; both will lead between the Meemattia rock and the Inner Cadda rock. Proceed with these marks on, until the west turret of the church in the fort * is on with Elephant rock (which is a high, smooth, round-topped rock, unlike any other); then steer for Gravet point, (the termination of the high land in the north-east corner of the bay,) until the signal-staff on Neptune bastion is in line with the lighthouse. Then haul up for the Cutcherry police station, N. by E. ½ E., which will lead through in mid-channel between the *black* buoy of Polcatté and the *red* buoy of Matamada. When the lighthouse is shut in with Utrecht bastion, anchor in about 6 fathoms.

To pass south of the Cadda rocks, keep the church in the fort west of the lighthouse until the white mark is *well* shut in with Watering point; the rocks off Oonawatty point will then be open of the point, and in line with a distant point to the eastward. Then steer to the eastward until the

* Care must be taken not to confound the white gabled chapel on an eminence outside the fortifications with the church in the fort.

Pilot's tree (the large mushroom-shaped tree on the summit of Moodliar hill) bears N. by W.; the left shoulder of the hill will then be clear of the almond tree, near the Sailor's bastion. Haul up for the Pilot's tree until the signal staff and lighthouse are in line, then proceed as above directed between the Polcatté and Mata-mada buoys.

CAUTION.—Sailing vessels approaching Galle should be careful to keep a weatherly position to enable them to sail in, and it should be borne in mind that the current sets along the line of coast with great velocity—to the eastward during the S.W. monsoon, and to the westward during the N.E. monsoon.

Vessels, during the S.W. monsoon, by getting to leeward of the port, have taken weeks to regain their position, and in some instances have been compelled to bear up for Trincomalee.

The WHALE ROCK, under water, bears W. ½ N. 2½ miles from Point-de-Galle lighthouse, and is nearly 1½ miles from the nearest shore; it always breaks, but in fine weather only once in four or five minutes, so that a good look-out is then necessary. There is a channel inside of it, with 7 or 8 fathoms water, rocky bottom; but the soundings are irregular, and there is a bank of 4 and 4½ fathoms halfway between the Whale and the shore, so that the inside channel should not be taken except in case of necessity, as there are many shoal spots within half a mile of the coast. There are 7 fathoms close outside the Whale; 12 fathoms at the distance of 2 cables; and 20 fathoms three-fourths of a mile off. The soundings, between the Whale and Gindurah rock, deepen gradually from 8 fathoms near both rocks to 20 fathoms midway between them.

The LITTLE WHALE is a small rock above water, lying about halfway between the Whale and Point-de-Galle lighthouse, on nearly the same line of bearing. There are many rocks inside of it, with only from 3 to 6 feet water on them. Vessels, therefore, when driven to the necessity of passing inside the Whale, must haul out between it and the Little Whale, where there is a clear channel with 8 to 10 fathoms water, rocky bottom.

The most recent trigonometrical survey of Ceylon marks a small bank, called Cadra-welle, lying half a mile S.E. of the Little Whale, but no mention is made of its depth of water. The Galle-ho-galle bank, having 17 fathoms, lies 2 miles to the southward of the Whale rock.

GINDURAH RIVER entrance is 3 miles N.W. ½ W. from Point de Galle lighthouse, and may be known by the different character of the coast on each side of it; that to the north-west is low and sandy, while to the south-east is a rugged, rocky, and rather prominent point with some rocks off it, and this kind of coast extends halfway from the river to Point de Galle fort; other rocks lie off shore between this point and Little Whale.

GINDURAH ROCK.—This rock under water, called Medda by the natives, lies 2¼ miles W.S.W. of the river mouth, and W. by N. ¼ N. 4¼ miles from Point de Galle lighthouse. On its shoalest part there is only 9 feet water, so it is very dangerous, as it does not always break; a depth of 4 and 5 fathoms is found about a cable's length from it all round, and 15 fathoms two cables outside of it. A little shoal coral spot of 3 fathoms lies rather more than half a mile E.N.E. of it, and there is a depth of 16 fathoms between them. The channel inside of Gindurah rock should be avoided on account of the above shoal. To clear outside of Gindurah rock, Akorále point to the northward must be kept open to the left of Waal island; or, Oonawatty point kept open outside the breakers of the Whale rock. From the shoalest part of Gindurah rock, the Haycock mountain (which is 19 miles inland of Gindurah on a bearing of N.N.E.), will be seen about a sail's breadth to the left of a small white-topped rock, called Gull rock, near the beach, one mile north-west of Gindurah town.

GODDA BANK.—This bank, the least water on which is 4 fathoms, with rocky bottom, lies 3½ miles to the north-west of Gindurah rock, and 1½ miles S.W. of Dodandowe village. It may be avoided by keeping Sénegamme point (which is just inshore of Debaha rock), open to left of Waal island.

DODANDOWE is a village with a custom house on a small river, 4 miles N.W. of Gindurah town; the river entrance is north of the village, and has two rocky islets off it, both are less than one cable's length from the sandy shore; the northern islet, called Medda, affords some shelter from southerly winds to the landing place at the river's mouth. Manda, the southern islet, is more than a cable's length from the other, and bears N.W. ½ W., 7¾ miles from Point de Galle lighthouse. Dodandowe outer anchorage is in 6 or 7 fathoms, sand, 2 cables to the N.W. of Medda islet, and with the breakers on Dodandowe rocks about S.S.W., but small vessels may go further in, till Manda islet disappears behind Medda, and anchor in 5 fathoms, equidistant from Medda islet, from the sandy shore to the east, and from the Gona rocks to the northward.

Dodandowe Rocks, never above water, though always breaking, lie 2 cables W. by N. of Manda, and there is a fair channel between the islet and those rocks; but Oráva rock, with 6 feet water on it, is situated a cable's length N.N.W. of Dodandowe rocks; and Kádul bank (depth of water not mentioned) is half a mile south-west of Manda islet; so it is prudent to pass westward of all these dangers in either entering or leaving Dodandowe anchorage.

HICCODE ROCK.—This outlying rock, the outermost danger in Dodandowe bay, lies 1¼ miles W. by N. ½ N. from Medda islet, and one mile

from the nearest sandy shore; it is small, having 6 feet water over it, 7 fathoms near it all round, and 15 fathoms a cable's length to seaward. Half a mile in shore of it, there are some rocks, called the Oon reef, between which and Hiccode rock there is a passage for vessels, but they had better keep outside of all these dangers.

To clear outside of Hiccode rock,* Debaha rock must be kept well open of Waal islet. In passing along this part of the coast, do not come under 20 fathoms, the soundings being very irregular, and the bottom rocky towards the shore.

WAAL ISLET.—This islet is situated 3 cables' lengths off Waal point, and bears N.W. from Manda islet rather more than 2 miles; this is a high rocky islet, surrounded by smaller ones. Waal point, (Ragamma point of Horsburgh,) is low, and covered with cocoa-nut trees. Hiccode rock lies $1\frac{1}{4}$ miles S.S.E. of Waal islet.

Debaha Rock stands about half a mile to S.W. of Sénegamme low rocky point, and bears from Waal islet N.N.W. $\frac{1}{2}$ W., $1\frac{3}{4}$ miles. This rock is elevated a few feet above the water, and has the appearance of being split into two, or as if one part had fallen from the other. Midway between Sénegamme point and Waal point are the creek and village of Hickadowe, with a traveller's rest house, which, being hidden by cocoa-nut trees, cannot be distinguished from seaward; a gap in the reef, which fringes the coast, affords a passage for small boats and anchorage off the town.

AKORÁLE POINT, called also Webille, bears N.W. by N., $2\frac{1}{2}$ miles from Sénegamme point; it is low and sandy, covered with cocoa-nut trees. Off the point lies the Túng rock, and half a mile N.W. of this, the Vatang rock; several shoal spots extend more than one mile off shore, with from 6 to 9 fathoms water betwixt them.

PASSEE ROCK.—This rock, the outermost of the above dangers off Akorále point, is a small rock above water, with a bank extending from it about 2 cables to the southward, on which the sea breaks heavily; this rock bears West from Akorále point a large mile; there is a passage between it and the shore, but a ship should always pass outside, as another rock is said to lie 3 or 4 cables northward of Passee.

GINDAVÁNA ISLET, rocky, and of moderate height, stands at the distance of 2 or 3 cables from the shore, bearing N.N.W. from Akorále point rather less than 3 miles. Amblangodde rest-house, a conspicuous building

* *See* Chart:—Indian Ocean, Ceylon, South Coast, No. 813; scale, $m = 0{\cdot}25$ of an inch.

from seaward, stands on the summit of a rocky cliff, half a mile S.E. by E. from Gindavána; close to the southward of the rest-house, there is an opening in the rocks forming a cove, with a sandy beach about 100 yards in extent, and anchorage in 2½ fathoms water; a small river has its mouth to the south of Amblangodde, and off it are several rocks, amongst others are two called Hiria and Tal Gaha. Off Patiagalle point, which is three-fourths of a mile S.E. by S. of Gindavána islet, there is another rock called Radul. White coral is found in such quantities on this part of the coast, that an active trade exists in shipping it to Colombo and Point de Galle, where, when calcined, it serves as the only species of lime used for buildings of all kinds.

The village of Amblam is 1¼ miles to northward of Gindavána, and off it, nearly one mile from the shore, lies Wathu or Bálu bank, having 3 fathoms water; this seems to be connected with the bank on which stand the Myimba rocks.

MUTA AMARATA BOKA POINT (the Cocacheira point of Horsburgh), bearing N.N.W. and 5¼ miles from Akorále point, is rocky and of moderate height. Myimba rocks, two rocks elevated a few feet above water, stand a quarter of a mile westward of the point; and, close to the north of it, is the entrance of Balapitti Modere, a river which is small and navigable for very small boats only. A custom house stands on the north side of the entrance, where the shore is low and sandy, and not so prominent as the south side, called Balapitti Modere point, which is rocky and slightly elevated.

HARISPOL POINT, three-fourths of a mile north of Balpitti river, is low and sandy, but has several high rocky islets lying close off it; between it and the river mouth, there are several rocks above water, surrounded by a reef, between which and the shore there is anchorage off the bar of the river in 2 fathoms, sandy bottom; the passage is between this reef and Balapitti Modere point. Several rocks having only from 2 to 6 feet water over them, lie off this part of the coast, from a quarter to three-quarters of a mile off shore.

AHUNGALLE POINT, bearing North, 2 miles from Muta Amarata Boka, is low and rocky, the southern extreme of some rocky cliffs half a mile in length; the northern end is of considerable height and called Kosgodde hill; on the summit of the cliffs near Ahungalle point stands a house conspicuous from seaward.

ALUT ROCK.—This rock, having only 8 feet water on it, and deep water all round, lies 1¼ miles West from Ahungalle point. When on the rock, the Haycock hill is in one with the house above-mentioned. To pass outside of Alut rock, Gindavána islet must be kept open of Myimba rocks and no vessel should shoal under 12 fathoms by day, or 17 by night.

NAPA ROCK, lying 1¼ miles due North of Alut rock, and one mile off shore, has 2 fathoms water on it, and 8 fathoms close outside; it forms the northern extreme of the Conda bank, which extends to the southward till half a mile inshore of Alut rock.

BANK.—Horsburgh, in his valuable India Directory, makes mention of a bank, having 30 and 32 fathoms water, with 37 and 38 fathoms inside, between it and the land. From it the Haycock mountain (bearing about East and 16 miles inland of Kosgodde hill), bore about East; the distance from shore was about 15 miles, and it extended a considerable distance to the southward. The latest charts exhibit a similar bank, some 20 miles in length north and south, lying parallel to the shore and 9 or 10 miles off, between Barberyn island and Akorále point; and it probably extends still further southward, as there are indications of it 13 miles due West from Point de Galle.

UNAPAYAGALLE POINT, bearing N. by W. ¾ W., 3½ miles from Ahungalle point, is low and rocky, and continues so for one mile in a southerly direction to Nyakandugalle point, but between this last and Kosgodde hill the shore is sand. Kerevanne rock, a small white-topped rock, stands a quarter of a mile S.W. of the point; and one mile West of this rock, is the North extreme of Outaree, a rocky bank having a depth of 4 fathoms, extending southward till within half a mile seaward of Napa rock.

Dodompara rocks stand above water three-fourths of a mile N.W. of the above point, and half a mile off the nearest shore, abreast of a little hill called Galbode-Kande, which is a like distance from the beach; and, between these rocks and Oodapitta point lie several others with from 3 to 6 feet water on them, and from a quarter to half a mile off shore: outside these rocks there are 5 and 6 fathoms water, sandy bottom, with occasional patches of coral.

OODAPITTA POINT, bearing N. by W. ½ W., 3 miles from Unapayagalle, is rocky and of moderate height, having several rocks above water lying off it. The Anderan rocks are two rocky islets lying off this point, bearing W.N.W., half a mile from it; there is a depth of 6 and 7 fathoms close outside of them, and 4 or 5 fathoms inside, between them and the sandy point which dries off Modere-galle (the rocky point that forms the south side of Bentotte river, and is in reality the northern extreme of Oodapitta point); but no vessel should pass between Anderan rocks and the point, for there are several rocks having only 3 or 4 feet water.

BENTOTTE RIVER entrance is three-fourths of a mile to the North of Oodapitta point; the town of Bentotte is on the south bank, and half a mile from the bar, on which there are only 3 or 4 feet water, but this

depth varies according to the season, being much greater after heavy rains when the bar becomes navigable for the native coasting craft. Inside the river, there is a depth of 1 and 2 fathoms. As the sands on the bar frequently shift, and there is generally a surf, boats should not attempt to cross it without a pilot.

BARBERYN ISLAND.—This little island, standing about 2 cables off the main land, to which rocks connect it, forms a prominent point of the coast, bearing from the Myimba rocks off Cocacheira point, about N. by W. ½ W., a distance of 12¼ miles. It is 3 miles N.W. by N. of Bentotte river, and most of the intermediate coast is rocky. This island, being small and so close to the shore, is not easily perceived, except when near; there is anchorage to the northward of it in 6 or 7 fathoms, and a small bay further in, with 2 or 3 fathoms, sandy bottom, where small craft may anchor. The latest chart does not exhibit any rocks projecting from the north-west end of the island, such as Horsburgh describes, but it will be prudent not to shoal under 14 fathoms when passing the place.

CALTURA FORT, on the east bank of the Kálu Ganga river, and about three-fourths of a mile N. by E. of its entrance, bears from Barberyn island N. ½ W., 7½ miles. The land, on which the fort stands, is a little elevated, and about half a mile within the average line of the sandy shore which extends from Caltura two-thirds of the way to Barberyn, to Magoona point, 1½ miles to the south-west of Beach hill; nearly a mile off this last-named point stands a rock called Nawoelle-kande, and a sunken rock lies half a mile to southward of that.

Ships should not come under 10 or 12 fathoms, off Caltura, on account of foul ground both to the north and south, except they intend to anchor in the roadstead. Steer in for the fort, about East, keeping it between two of the Hummocks at the south end of some high land (25 miles eastward from the sea); the northernmost Hummock or Knuckle is the lowest. With these marks on, a ship may run in and anchor in 5½ or 6 fathoms water, tolerable ground, but it is rocky out in 15 or 16 fathoms. When approaching Caltura from the southward, ships may steer for the fort when it comes on with Adam's peak, thus giving the 2-fathom rock a wide berth of one mile.

Two-fathom Rock.—This is the principal danger off Caltura, lying a good mile off shore, and on the bearing of S.W. ½ S. from the fort, a distance of 1¾ miles; it has a depth of 12 or 13 feet on it, and does not break, except in such bad weather as would forbid a ship's communicating with Caltura. The rock is in the line of 6 fathoms, so that small vessels may pass between it and the shore in 4 fathoms, but large ships should not shoal under 10 fathoms. Another rocky patch, with 3 fathoms water, lies

S. by E. ½ E., a short 2 miles from the Two-fathom rock, and is 1¼ miles to the northward of the high rock, off Beach hill, called Nawoelle-kande.

The COAST northward of Caltura to Pantura is low and sandy, abundantly planted with cocoa-nut trees. There is canal communication between these places and Negombo. Inland, some 25 miles eastward from Caltura, is a range of hills, the two southern Hummocks of which, known also as the Knuckles, are useful landmarks in clear weather for this part of the coast.

Desaster Rock, off a village of that name, stands close to the shore, about 1¼ miles to N.W. of Caltura fort; there are sunken rocks both to north and south of it, and a ship has no business under 10 fathoms.

PANTURA.—This large town, bearing N.N.W., 8 miles from Caltura fort, is at the mouth of a river which flows from Pantura lake. On the south side of the entrance are two rocks above water, surrounded by others under water; the outer one stands nearly a mile W.S.W. of the town, and has a depth of 8 fathoms close outside. The anchorage is to southward of these rocks in 10 or 12 fathoms, nearly 2 miles off shore. A high tree stands behind the cocoa-nuts, 2½ miles northward of Pantura, nearly a mile from the beach. About 2 miles N.N.W. of this tree, there is a rocky bank of 3 fathoms, about a mile in length, lying parallel with the shore line and half a mile off, opposite the village of Digorella.

MOUNT LAVINIA, a rocky headland, the most prominent point between Barberyn and Colombo, bears N.N.W., 7¾ miles from Pantura. On it are the remains of what was once the marine palace of the Governors of Ceylon. A narrow rocky bank, with one fathom water, lies alongshore southward of the mount, and extending more than half-way to the Digorella bank. Off Pantura and Caltura, soundings of 10 fathoms are not found within 2 miles of land; but abreast of Mount Lavinia, that depth is less than half a mile off, and westward of Colombo fort a full mile off. To the southward of Colombo, along the shore, lies the suburb of Colpetty, with its numerous villas. A considerable space is left clear of houses on the south of the fort; this is called the Galle-face.

COLOMBO.—The flag-staff, which is close to the lighthouse, in lat. 6° 56′ N., long. 79° 50′ E., bears N. by W. from Mount Lavinia, distant 6¼ miles. The coast about Colombo is low, and not visible from seaward more than 10 miles. About one mile northward of the fort near Mutwal there are some lofty fir trees, which are generally seen when approaching from seaward before the lighthouse or flag-staff. They afford a good landmark for Colombo, as, when viewed from seaward, they appear considerably elevated above the surrounding cocoa-nut trees, and seem as one tope rather thinly planted. No other part of the coast either north or south of Colombo affords a similar mark to this.

The Dutch church, a large building in the bottom of the bay (to the north-east of the fort), the upper part of which has a thatched belfry, and may be seen over the houses of the town, forms a good mark as a cross bearing for vessels coming to an anchor in the roads.

There are some isolated hills at a distance in the country, and the high mountain having on it a sharp cone called Adams peak, 7,420 feet above the level of the sea, has been seen in clear weather at a distance of 30 leagues. In the N.E. monsoon it is generally visible in the morning and sometimes throughout the day, but it is rarely seen in the S.W. monsoon through the humid atmosphere which prevails in that season.

Sunken Rocks.—The first danger in approaching the roadstead from the southward is the Drunken Sailor, a ledge of rocks with only 6 feet water over the shallowest part, which bears W. by S. $\frac{3}{4}$ S. from the light tower, and is distant off shore about half a mile. This danger during the S.W. monsoon has a constant break of the sea; but not during the N.E. monsoon, with smooth water,* and it will then be prudent not to come under 10 fathoms water, when in the vicinity of these rocks, as there are 8 fathoms close outside them, until the Custom-house point bears to southward of E.S.E.; then stand in for the shipping, as no advantage can be gained by steering close to these rocks at any time.

Another Sunken Rock, with 20 feet water over it, has been discovered in the approach from the westward. It lies about half a mile to Northward of Drunken Sailor, and bears W. by. N. from the Custom-house point, and N.W. from the flagstaff. A *red* buoy is placed a few yards to the West of it, to which all vessels must give a clear berth of half a cable's length.

A ledge of rocks stretches along shore to the northward from Mutwal; but as this ledge is only about a quarter of a mile off shore, and out of the usual track of shipping, it is scarcely worthy of note as a danger.

PORT of COLOMBO.—The roadstead of Colombo, although exposed to the S.W. monsoon, is a safe one for vessels well found in ground tackle. Vessels generally ride out the monsoon at single anchor, with a long scope of chain. A gale of wind may occur about the changes of the monsoon, in the months of May, June, November, and even as late as December; though a gale in the latter month is very rare, and several years sometimes pass away without any beyond a stiff monsoon breeze. These gales are seldom violent, and it is only during them that casualties occur to the shipping. Only five vessels have been wrecked within the last thirty-two years. Communication between the shore and shipping is seldom inter-

* Notice is given that in future a *black* buoy will also be placed, during the N.E. monsoon, from October 15th to April 15th, close on the west side of Drunken Sailor.

rupted, although there are occasional spells of squally weather and a high sea during the S.W. monsoon, which make the passage over the bar difficult and dangerous, especially for small boats.*

The Inner road or harbour is mostly occupied by the native coasting vessels. It is considerably sheltered from the S.W. monsoon by the north bastion of the fort and bar, and affords good and safe anchorage for vessels drawing not over 11 feet. The bar is a shifting sand-bank, extending for about $1\frac{1}{2}$ cables' lengths, from the north bastion in a direction towards Mutwal point; there are 7 to 12 feet water on it, and $3\frac{1}{2}$ fathoms inside and beyond it. Strangers should not enter the Inner road without a pilot; and as the sea sometimes breaks on the bar during the S.W. monsoon, and several lives have been lost by boats being swamped, they should not use their own boats in landing, but employ one of the outrigger canoes, which are always available, until they become acquainted with the passage over it.

The Ballast Ground during the S.W. monsoon is in 15 fathoms water, with the flag-staff bearing about East; and during the N.E. monsoon in the same depth of water, with the flag-staff about E.S.E., where vessels may discharge their ballast overboard.

Supplies.—Colombo abounds with good water, and other refeshments. The exports to Europe are cardamoms, cinnamon, coffee, cocoa-nut oil, coir cordage, ebony, pepper, plumbago, and satin-wood; and the trade is increasing every year.

TIDES and CURRENT.—The current off Colombo, and in the Gulf of Manár, is subject to considerable variation, particularly about the changes of the monsoon, when it is the strongest, but generally speaking it sets with the monsoon, and is never so strong as to inconvenience vessels making Colombo. The greatest difference between high and low water recorded at Colombo is not more than 2 feet 10 inches. In the S.W. monsoon, when the mean level of the ocean is the lowest, the difference between high and low water is from 5 to 15 inches. On those days when the difference between high and low water is not more than 6 inches, the rise and fall has been observed to take place four times within twenty-four hours.

LIGHT.—A *fixed white* light is exhibited every night from the clock tower, a square gray-looking building, standing in the centre of the fort. The light is elevated 133 feet above the level of the sea, and visible in clear weather from a ship's poop 18 to 20 miles.

---

* *See* Chart; Indian Ocean, Ceylon, South Coast, No. 813; scale, $m = 0{\cdot}25$ of an inch.

ANCHORAGE.—A vessel may anchor anywhere in the outer roads with the flag-staff bearing from S. ½ E. to S.E. by E. in 6½ to 9½ fathoms water, and distant from the north bastion of the fort from half to one mile. The best anchorage is with the flag-staff bearing about S.S.E. ¾ E., and the Dutch church E. by S., in 8 fathoms water. Vessels arriving during the S.W. monsoon, or about the changes of the monsoon, should not anchor nearer the north bastion than half a mile, or bring the rocky point at Mutwal (which is about 1½ miles northward of the fort) to bear northward of N.E. ½ E.; and they are recommended to ride with not less than 80 fathoms cable to the hawse, and to have all the shackles looked to and the small pins well secured before coming to an anchor. The constant pitching motion, to which vessels are subjected, causes the cables at some distance from the hawse to beat and chafe on the ground, and the shackle pins frequently work out if not well secured. The small pins should be of iron with large heads, and the other ends well clinched over a ring; if not clinched they invariably loosen, and work out.

DIRECTIONS.—Vessels bound to Colombo during the S.W. monsoon from south of the Equator, should not cross it to the eastward of 78°, as between 3° N. and the coast of Ceylon a strong current sets to the eastward, and the wind frequently hangs from West until the Gulf of Manár is entered, thus making it difficult to fetch the port if not well to windward. The coast for 30 miles south of Colombo may be approached with safety to a distance of 2 miles.

A steep bank of coral lies in a very narrow strip, parallel to the line of coast, about 8 miles off Colombo, extending a few miles southward, where it is deepest, having 18 and 20 fathoms with 25 fathoms inshore of that, and extending to the northward till nearly abreast of Negomba, where it is shoalest, having 11 or 12 fathoms, with 18 or 19 fathoms inside. With Colombo bearing S.E. by E., distant 12 miles, the bank has 15 fathoms, outside of that it deepens at once to 23, and, at 2 miles from it, there are 28 fathoms, greenish sand. Within the bank there are 25 fathoms opposite Colombo, gradually shoaling towards the shore. The extreme verge of the bank of soundings is only 3 or 4 miles outside this bank.

The COAST.—To the north of Colombo, in the cinnamon garden of Kadaráni, standing 5 miles apart, are two towers, each 100 feet high, which mark the ends of a base-line, measured in 1845, from which the trigonometrical survey of the island of Ceylon commenced; these towers are some little distance from the sea-shore, but, being not much higher than the cocoa-nut trees of the coast, are not discernible from seaward. The shore line, from the mouth of the Kalani-ganga to Negomba, runs tolerably straight for 14 miles, low and sandy, and fringed with cocoa-nut trees.

The soundings near shore are more regular than further southward; shoal

water extends a greater distance off shore, but, the bottom being almost all mud within a line drawn from Colombo fort to Negomba point (except the rocks at the mouth of the Kalani-ganga), a vessel can stand in to 7 fathoms by day in fine weather.

NEGOMBA POINT is nearly a mile westward of the large town of that name, and bears N. ½ W. 16 miles from Colombo lighthouse. Canal communication exists between these places, opening out into Negomba lake, which is upwards of 5 miles in length by 2 in breadth, and, at the rainy seasons, discharges a great body of water that runs to the northward through an opening between the fort and the point. Negomba has a considerable trade, and may be known by the prominent point which is covered with cocoa-nut trees ; off it a ledge of rocks awash extends N. by W. ½ W., for 2 cables' lengths, and this may be traced in the same direction with depths of 3, 4, and 5 fathoms over it for 2¾ miles farther, till it terminates in a coral patch, having 9 and 12 feet water, at a distance of 3 miles from Negomba point, and 2½ miles W.S.W. of Kémel river entrance.

Anchorage.—Small craft can cross this ledge and anchor in 2 or 3 fathoms with Negomba point S.W. ½ W., and the fort S.E. by E. at the distance of 3 or 4 cables from the sandy shore. For large vessels, the best anchorage is one mile off the rocky point, with the fort bearing East a little northerly, in 6½ to 7 fathoms, sand ; but, as this sand is not deep, and the stream of the Negomba lake sets to the north, vessels are warned against anchoring here during the S.W. monsoon, or from May to August inclusive.

KÉMEL RIVER entrance is 4 miles northward of Negomba, and causes a break in the line of cocoa-nut trees which fringe this sandy coast. At Ooluwitti, a village 3½ miles northward of the Kémel, the coast is a little projecting, but the bottom out to 5 fathoms is mud, and the shore safe to approach. Onwards to Chilaw there is the same straight sandy coast with topes of trees about the villages.

CHILAW.—This town, which is 22 miles due North of Negomba point, stands on the east bank of an estuary that runs parallel and very near to the coast, having a common mouth with the Dedru-oya river at Chilaw point, about 2 miles northward of this town. There is a bungalow on the shore abreast of the town, conspicuous by its red-tiled roof, and seen 8 or 9 miles from a ship's deck in clear weather. Chilaw point is 2 miles to the north of the bungalow, and may be known by a sand-hill, having on it some bushes, and near it there is a round hummock.

Anchorage.—The mouth of the Chilaw estuary and of the Dedru-oya is close to the north of the point, and vessels may anchor abreast this

river mouth with it bearing S.E., in 5½ or 6 fathoms, mud, about three-fourths of a mile off shore. In coming to Chilaw from the north, a vessel should keep out of soundings, some 2 miles off the outlying banks along the shore of Calpentyn, till half-way between these two places, when she may haul in towards the shore. There are some rocks 5 miles due North of Chilaw bungalow, but as they are not more than three-quarters of a mile off shore, they do not form an obstacle to the general navigation of the coast; they are partly above water, and lie in the line of 4 fathoms.

In approaching Chilaw river from the south, a vessel may stand close along shore in the anchoring depth till abreast of the river; rocks fringe this sandy shore from the point to a distance of 3 miles southward of the bungalow.

The COAST from Chilaw point towards the north belongs to Calpentyn island, which is low and sandy, on a coral foundation, a long sweep of desolate shore; having a general direction of N. by W. for 32 miles to the westernmost projection of the island, then North for 5 miles to its north-west point; trees exist only by the villages, and these are few and far between, as the Putlam lake and the backwater southward of it so completely cut off Calpentyn island from speedy communication with the mainland of Ceylon.

Putlam is a large town with a fort near the south-east corner of the lake, 6 miles away from the sea, but the strip of Calpentyn island opposite the town is only half a mile broad. The south extreme of Putlam lake is well defined by the 8th parallel of latitude. Off this part of the coast, about half-way between Chilaw and Calpentyn towns, and some 3 or 4 miles off the sea-face of the island, there are uneven soundings on rock with so little a depth as 3¼ fathoms, and 6 to 8 fathoms immediately outside; vessels of size ought therefore to be careful not to come within 5 miles of land hereabouts, or expect to get soundings, as these shoal spots are not 2 miles from the edge of the bank of soundings; small craft, however, can at all times go over these shoals.

CALPENTYN ISLAND.—This island is upwards of 40 miles in length parallel to the Ceylon shore; its south extreme forms the north side of the Dedru-oya river mouth; when viewed from the offing, the island appears as part of the mainland. The town and fort of Calpentyn are 1½ miles from the north extreme of the island, on its landward side; boats have access to the town from sea by a narrow passage, called the Gut (separating Long island from Calpentyn), as well as by the broad channel to the north of Long island, between Dutch bay and Kara-tivo.

DUTCH BAY.—This is a snug little cove, formed by the two northern forking points of Long island, which lies to the north of Calpentyn island, and, from seaward, seems to form a part of it, thus extending the

island to all appearance 3 miles northward. This bay is opposite the south end of Kara-tivo island, but the water between them is shallow; it affords shelter from all winds, but more particularly from the S.W. which are the strongest.

Anchorage.—Vessels can anchor in 2½ to 3 fathoms, stiff mud, close inside the neck of sand that forms the west side of the bay, with a house in a cocoa-nut tope, called Paringé-torai, bearing S.S.W. The only dangers in the approach to it are a rocky patch with 2¾ fathoms over it at low water, lying 2 miles W.S.W. of the north end of the neck of sand, just mentioned; and some shoal water bearing N.N.W. 3 miles from that neck, and 2½ miles due West from the palmyra trees on the island of Kara-tivo. This last shoal water extends North and South about 2 miles, with an average breadth of one mile, and has over it from 3 feet to 3 fathoms, with a small patch of sand, generally dry, bearing due West of the above trees. To the eastward of this reef, between it and Kara-tivo, there is a passage with a depth of 4 to 5 fathoms; but no person, without being well acquainted with the coast, ought to attempt this.

Bring the neck of sand of Dutch bay to bear S.E. by E., then steer for and pass it within 50 yards, carrying 3 to 4 fathoms, sand.

KARA-TIVO, or CARDIVA ISLAND, the north extreme of which bears N. by E. ½ E. 19 miles from the north-west point of Calpentyn island, is a long narrow strip, extending north and south nearly 12 miles, nearly parallel with the Ceylon shore, from which it is distant on the south 1½ miles, on the north about 4 miles, and a channel for coasting craft exists between them. Kara-tivo is low, with sandy hillocks in some parts, and bushes or trees in others; that part which lies N.N.E. of Dutch bay has some palmyra trees, a few of which are leafless, and these form a good mark for the outer sandy shoal patch, mentioned before as lying to the north of the entrance to Dutch bay. On the main-land, behind Kara-tivo, there are ridges of hills moderately elevated, which, being seen in clear weather at a distance of 7 miles off shore, have the appearance of being on the island.

The edge of the bank of soundings is 6 or 7 miles off the sea-face of Kara-tivo; a vessel should not shoal under 7 fathoms water, as several small rocky banks lie from 2 to 4 miles off the land; to the north of the island, shoal patches, with 3 fathoms water, extend 6 miles off. Horsburgh's Directory remarks, "the south-westernmost of the Aripo shoals lie 15 miles to the N.N.W. of Kara-tivo island;" but that part of the Gulf of Manár is unfortunately not sounded, being exhibited as a blank space in the latest charts.

KODRA-MALAI POINT is on the mainland, E. by N. ½ N., 4½ miles from the north end of Kara-tivo, and 30 miles northward of Putlam, the

intermediate shore taking a tolerably straight direction of N. ½ E. The point is steep and rocky on its north side, and may be known by the 3 long hills seen over the low land of Kara-tivo. From Kodra-malai the coast runs N.E. for 4 miles to Moderegam point, forming a bay between; thence more northerly towards Condáchi and Silavatorre.

Anchorage.—Very good anchorage, in the S.W. monsoon, may be found under the lee of Kodra-malai point. Steer for it with the north end of the hills bearing E. by S. till the vessel is well past Kara-tivo island; then, altering course as requisite for rounding-to, the anchor may be let go in 2½ to 3½ fathoms, sandy bottom, with the rocky promontory bearing between S.S.W. and S.W. at a distance of from half a mile to 1½ miles.

No vessel ought to proceed on the Ceylon side further northward than Kodra-malai towards the head of the Gulf of Manár, as there are many shoal * places at some distance from the shore, and no good holding-ground. In the S.W. monsoon, a strong current is found setting northward over Adam's bridge, which abates as the Indian coast is approached; a confused sea is generally found to prevail near Manár.

CONDÁCHI, is a village on the sea-coast, at the bottom of a bight, midway between Moderegam point and the Aripo river mouth, bearing from the former N. by E. ½ E. at a distance of 8 miles. The Kal-ár river is 3 miles south of Condáchi, and the sandy shore, between it and the Arive-ar or Aripo river, is, during a pearl-fishing season, the resort of thousands of people who are engaged in the trade. Enormous mounds of shells raise this shore to a height of several feet; these are the accumulation of ages, the millions of oysters having been, year after year, flung into heaps that extend for many miles along this shore.

The Pearl Banks are outlying shoals that extend many miles off the shore between Condáchi and Manár island. On approaching the oyster-fishers' resort from seaward, the first landmark seen is a building, erected as a temporary residence for the Governor of Ceylon, and known by the name of Doric, from the style of its architecture. A few cocoa-nut palms appear next above the low sandy beach, and presently are discerned the scattered houses which form the villages of Aripo and Condáchi, 5 miles apart. During the progress of a fishery, this dreary expanse becomes enlivened by the crowds who congregate from distant parts of India, and there suddenly springs up a town of temporary dwellings, huts of timber and palm-leaves, with tents.

* To avoid some lately discovered rocks more than 2 miles S.W. of Silavatorre, small vessels, bound to that place from the southward, must stand in East for Kal-ár, until the Doric bears North; then haul up to Northward, bringing the Doric to bear N. ½ W. when off Condáchi.

ARIPO RIVER, or Arive-ar, falls into the sea by three or four mouths to the north of the village of Aripo. The most prominent point of its little delta bears N.N.W. ¼ W. 7½ miles from Condáchi village, and the coast runs on in a nearly North direction for a like distance to the little islets and creeks that separate the island of Manár from the mainland. The extensive bay, formed between the mouths of the Arive-ar and the west end of Manár island, is very shallow, and doubtless gradually becoming more so, for Horsburgh states that the anchorage at Manár is on the south side of the island, in 4 or 5 fathoms, about 4 miles to the westward of the gut which separates the island from the opposite point of Mantotte; but now that depth of water will not be found within 6 miles of the gut.

MANÁR ISLAND is separated from the mainland of Ceylon by a very narrow channel, which is said to have 10 or 12 feet water in some places. It is about 15 miles in length east and west, and its west point bears North 53 miles from the north-west point of Calpentyn island. The town of Manár is at the east end of the island, amongst cocoa-nut trees, and has an old fort. Manár was anciently the seat of the pearl fishery; but, at the present day, its importance has greatly declined. During the early ages, a considerable portion of the trade, between the east and west coasts of India, was carried on through the narrow channel which separates Manár from Ceylon, and active establishments were formed, not only at Mantotte on the mainland, but in the little island itself, to be used for unloading and reloading such craft as it was necessary to lighten in order to assist them over the shoals.

The fort at Manár, built by the Portuguese, and strengthened by the Dutch, is still in tolerable repair; the village has plenty of cocoa-nut trees, and presents an aspect of industry and comfort. But the country beyond is sterile, covered only by stunted trees. The most singular objects in the landscape are a number of the monstrous Baobab trees, whose importation, from the western coast of Africa to India and Ceylon, is a mystery as yet unsolved; one of the largest, at Manár, measured upwards of 30 feet in circumference, although it was a very little more in height. The sea-face of the centre of the island has low sand-hills for about 5 miles; the west end has abundance of cocoa and other palm trees by the villages. The barren sand-drifts of this island are adapted to the growth of the palmyra and cocoa-nut palm, though incapable of producing sufficient grain for its inhabitants. The bank of soundings extends 17 miles to the south-west of Manár island.

ADAM'S BRIDGE.—This barrier is a narrow ridge of sand and rocks, mostly dry, forming the head of the Gulf of Manár, and, with the islands

of Ramiseram near the Indian side and Manár on the Ceylon side, nearly connecting the latter with the continent. It extends nearly east and west, 16 or 17 miles, and is composed of shifting sand-banks with small intricate channels between them, in which the average depth is 4 feet at low water. The edge of the bank of soundings is 12 miles to the south-west of Adam's bridge.

RAMISERAM ISLAND, lying between Adam's Bridge and the south-east cape of Hindostán, is low and sandy, well planted with cocoa-nut trees towards its west end. In length, nearly east and west, it measures 14 miles ; its eastern half is merely a narrow strip of sand, but the breadth of the island, where the great temple stands, is nearly 5 miles. It is uncultivated, and principally inhabited by Brahmins and their followers, who are supported by the profits derived from the temples. The village of Thani Kodi, at the east extreme of the island, bears W. by N. ½ N., 16½ miles from the west end of Manár island.

The great temple, or coil, stands on a piece of rising ground on the north part of the island, bearing N.W. 10 miles from Thani Kodi, and E. ½ N. 5 miles from Paumben lighthouse. Its height is about 120 feet, and, with its majestic towers, its vast and gloomy colonnades, and its walls encrusted with carved work and statuary, this temple exhibits a grand example of the style of such monuments in Southern India ; though inferior in dimensions to those of Seringam, Mádura, and Tanjore. Thousands of pilgrims from all parts of India resort here. To the south of the great temple there is a fresh-water lake, about 3 miles in circumference. The town of Ramiseram stands north-east of the lake, and south-east of the temple, on the eastern sea-face of the island.

Coonducam point (the south-west point of Ramiseram island, between which and the Shingle islets lies the eastern channel to and from Paumben pass), bears S. ½ E. nearly 2 miles from the lighthouse. The extreme point is low and sandy, but cocoa-nut plantations commence about a cable from it and extend towards the town of Paumben and to the north-east where a high conspicuous tree stands about three-fourths of a mile from the point.

PAUMBEN PASS.—This most important channel between India and Ceylon, recently so much deepened and improved by blasting and dredging, leads the coasting craft from the Gulf of Manár into Palks straits, close along the west end of Ramiseram island, where the town of Paumben stands. This town is intermediate between the lighthouse and the west extreme of the island ; its regular inhabitants consist chiefly of boatmen and pilots ; and their occupation is in conducting vessels through the pass, unloading, and lading them. Anchorage fees and customs are levied by the British Government.

The Pass consists of a cutting through sandstone rock, and a dredging through a horse-shoe sand-bank on the Gulf of Manár side of it; an average depth of 12 or 13 feet water has now been obtained, and further improvement is expected. The approach to the northern entrance is marked by a buoy, from which the lighthouse bears about E. by S. and is 7 cables distant. South of the horse-shoe bank, protecting the Pass from the southerly swell of the S.W. monsoon, there is a large coral reef, on which stand the islets of Pullee, Pulleevausel, and Coorisuddy, all low and sandy, with stunted bushes. Eastward of this reef there lies another, on which stand the Shingle islets, bearing S.S.E. 3 miles from Paumben lighthouse, and 1¼ miles from the nearest shore of Ramiseram. There are channels round both east and west sides of the above reefs, by which small vessels approach the Paumben pass. For the Western channel, between Manauli and Pullee islets, the leading marks are, Tonitorai temple just open to the left of Pullee island.

LIGHT.—A *fixed* light is exhibited to the north-east of the town of Paumben, and one mile eastward of the pass. It is 97 feet above high-water mark; but its column, which is circular, is only 56 feet from base to vane, as it stands on an elevated piece of ground. The light is visible all round the compass, and seen 11 to 12 miles off in clear weather.

The SHINGLE ISLETS are heaps of shingle, 1½ miles to the S.E. of Coonducam point; the reef, on which they stand, extends rather more than a cable's length eastward of them. There is a shoal patch of 2 fathoms lying 4 miles S. by E. from these islets; to avoid this, attention must be paid to the chart,* which will be the best guide, if there be not a pilot on board. When going in by the Eastern channel, give the Shingle islets a wide berth of 3 or 4 cables' lengths, to avoid the foul ground off them; a good rule for passing clear is, not to bring the high conspicuous tree † to bear to the northward of N.W. by N., till close in with the south shore of Ramiseram island; then haul to the westward, and pass Coonducam point within 2 or 3 cables' lengths. A pole has been erected (1846) on the northern limit of the shoal water inside the Shingle islets, between which and Ramiseram deep water is to be found; the south end of the cut through the horse-shoe bank, by which vessels have to pass, when going through the Paumben channel, bears from this pole W. by N.

TONITORAI POINT.—This narrow tongue of land is the southern point of Mádura on the Indian coast, and is rather more than one mile

* *See* Chart:—Palk Strait and Gulf of Manár, by Powell, No. 68; scale, $m = 0{\cdot}24$ of an inch.

† *See* Chart:—Paumben Pass, by Powell, No. 69; scale, $m = 4$ inches.

West of Paumben town. The principal rocky barrier, across which the cutting of the Pass has been made, extends in a straight line from this point to Paumben flag-staff. Tonitorai temple stands 1½ cables' length within the point, and is an useful leading mark for the channel between Pullee and Manauli islets.

MANAULI ISLET, lying 7 miles to the south-west of Paumben light-house, is the easternmost of a number of islets, which, with their fringing reefs and intervening banks, lie at some distance off the Mádura shore between Tonitorai and Valinúkam points, thus sheltering a considerable extent of the northern waters of the Gulf of Manár from the swell of the S.W. monsoon, and affording convenient smooth water navigation for the coasting craft.

The eastern extreme of its fringing reef is 2 miles East of Manauli; and the passage, between it and the shoal water on the south of Pullee, is half a mile broad; the leading marks through it being, Tonitorai temple just open to the left of Pullee islet. A shoal patch, with 2½ fathoms water, lies outside of the reef, 2½ miles South of Manauli islet; and the south extreme of the reef encircling Manauli and Moosel islets bears 3 miles West from this patch.

ISLETS and SHOALS.—From Manauli, the chain of islets and shoals runs in a mean direction about W. by S. for 26 miles to Anapar-tivo. The soundings outside them are tolerably regular, but with some slight overfalls in a few places. About 4 miles S.S.E. of Moolee islet, which is 10 miles westward of Manauli, a shoal patch of 2½ fathoms exists amongst soundings of 8 and 9 fathoms, but this is the only dangerous overfall known as yet. No large vessel should, however, shoal under 12 fathoms, or sight these low islands, excepting Manauli and Anapar-tivo.

ANAPAR-ŢIVO.—This little island, lying 2 miles East of Valinúkam point, has a reef encircling it, and shoal water extending one mile to the south-west, between which and the point is the Western Entrance of the inland navigation along the Indian coast, by which small coasting vessels are enabled to work in smooth water for half the distance between Paumben and Tuticorin.

To the southward and westward of this islet, there are overfalls in the soundings, owing to the many pearl-banks; one shoal patch, with 3¼ fathoms, lies 5 miles S.W. from Anapar-tivo, and 3 miles East of the south end of Fresh-water island. There may be other shoals between this and Tuticorin harbour, but the bank of soundings has not been thoroughly examined. Therefore no large vessel has any business northward of that commercial port, and it will be a safe rule not to shoal under 12 fathoms above the parallel of 8° 30′ North latitude.

GENERAL DIRECTIONS for the INLAND NAVIGATION.—Small craft, in working down from the Paumben pass during the S.W. monsoon, will do well to take a pilot and keep inside the islands and banks, which render the water so much smoother, to Valinúkam point. They can there discharge the pilot, and work down the Indian coast as far as Manápaud point, when their fetching Colombo on the starboard tack may be considered certain.

In going eastward by the inland navigation towards the Pass during the S.W. monsoon, the entrance should be made between Valinúkam point and Anapar-tivo, where the depth is 5 or 6 fathoms, not approaching the latter so nearly as one mile, till its south end bears southward of East, when the islet may be passed at half that distance in about 3 fathoms water, and a straight course at N.E. by E. may be kept for the anchorage off Keelakári; the general sounding along this line is 3 fathoms, shoaling occasionally to $2\frac{1}{4}$ fathoms, sand; care must be taken to avoid some reefs nearly awash lying off Yéravádi point, which is $2\frac{1}{2}$ miles N.N.E. of Anapar-tivo.

The best anchorage at Keelakári is in $2\frac{3}{4}$ to 3 fathoms, stiff mud, with a detached ruin (eastward of the town) bearing North, and some large terraced houses about N.W. Pilots here come on board to take vessels to Paumben, which lies 26 miles farther eastward; but, should a vessel proceed without such assistance, the following directions must be followed :—

From Keelakári anchorage steer E.N.E., with Nájimundel point on the port bow, till a small tope of trees (standing between a hillock at the mouth of a rivulet and an old ruined temple) bears North. Then, for the purpose of crossing a sandy spit which has only 7 feet water in some places, steer about S.E. $\frac{1}{2}$ E., or, with the west extreme of the little island Taliári one point on the port bow; this will lead over the deepest part of the spit in $2\frac{1}{4}$ fathoms, where a buoy has been placed to indicate the channel. After passing over this spit, the water will deepen to 4 fathoms; two bungalows at the next point eastward of Nájimundel will then be seen; when they bear N.E. $\frac{1}{2}$ E., steer E.N.E., till they are passed, then a due East course will take a vessel to the buoys which mark the passage between the shoal banks at Ramasámy's Choultry.

In approaching these buoys, bring the southern one to bear E. by N., when about 3 cables' lengths off, to avoid a sandy knoll with only 7 feet water; haul more northerly as the buoys are approached, and, after passing between them, steer on about an East course for a high beacon erected on a patch of rocks, about 2 miles to the northward of Manauli island. Passing about half a cable's length to the northward of this beacon, stand on for the north end of Pullee islet, which must not be rounded within 3 cables' lengths; keep on about E.N.E., till the opening between Pullee and Pulleevausel bears South, then steer East, and anchor

near the horse-shoe bank channel, which has a buoy to mark its position. No vessel, drawing more than 8½ feet water, ought to attempt this navigation without a Keelakári pilot.

VALINÚKAM POINT, is 2 miles West of Anapar-tivo and bears W. by S. ¼ S., 32 miles from Toni-torai point; the navigation between these places has just been described in several previous paragraphs. The town of Valinúkam is more than half a mile within the point, but access to it from the sea may be had at a less distance on its north side, as it lies on the shore of the considerable bay formed to the northward of the point.

NULLA-TANI-TIVO, or Freshwater island, bears S.W. by W., 5 miles from Valinúkam point, and 7 miles W.S.W. from Anapar-tivo. It is abreast of Keelcaud point, from which it is distant about 1½ miles. The soundings are tolerably regular off it, but no large vessel should come under 7 fathoms. There is a very small islet 2 miles westward of it, and another beyond, called Oopu-tani-tivo, or Saltwater island, in contradistinction to Freshwater island, from which it bears W. by S., 5 miles.

VAIMBAUR.—This town, at which is the boundary between the provinces of Mádura and Tinavelly, bears about W. by S. ½ S., 18 miles from Valinúkam point. The intermediate coast, which is all low and sandy, well planted with palm trees, forms a considerable bight, at the distance of some 4 or 5 miles north-east of Vaimbaur. Scattered shoal banks extend off this shore for more than 5 miles, therefore no vessel should attempt to sight the land.

VYPAR RIVER and POINT.—The Vypar river falls into the sea between the village and the point of the same name, which bears S.W. ½ W., 7½ miles from Vaimbaur. This is a very shallow coast, the line of 3 fathoms water being 3 miles off shore; one shoal patch, having only 9 feet water, lies 5 miles East of Vypar town.

CHULLY-TIVO.—To the S.S.W. of Vypar point there are two or three sandy low islets, called Chully-tivo; the outermost of these is in a straight line between Vypar and Tuticorin lighthouse, distant from the former 3½ miles, and from the latter 10 miles. Nearly 5 miles westward of this outer islet, the coast forms a deep bight, at the bottom of which stands the town of Putnurmadúr, having some large clumpy trees which are visible 9 or 10 miles off shore, when no other landmark is visible.

As a rule, vessels of size ought not to approach the land, above Tuticorin, nearer than 6 or 7 miles, on account of the scattered shoals having less than 3 fathoms on them. When the large trees of Putnurmadúr bear to the northward of West, this shoal water is all to the northward.

TUTICORIN TOWN and HARBOUR.—This, the largest commercial town on the Indian shore of the Gulf of Manár, is situated 8 miles South of Putnurmadúr trees, and bears from Vypar point S. by W. ¾ W., 14 miles. The land about Tuticorin is low and sandy, with palmyra trees near the town ; on the north side of which there are a flagstaff, a tower on the beach, and a Protestant church ; on the south side there is a Roman Catholic church, with some screw-houses where cotton is pressed.

The harbour is fronted by several low islands and banks, running north and south, or parallel with the shore, at about 2 miles distance. Outside of these banks is Tuticorin roadstead, with anchorage in 5 to 6½ fathoms, sand. On the north point of one of the islands, called Paundian-tivo, or Hare island, there is an obelisk, from which a light is exhibited.

There are two channels for small craft into Tuticorin harbour, but that to the North is so intricate as to be seldom used. The Southern channel leads between the southernmost island and the main land ; the reef connecting them has to be crossed in 12 to 14 feet water, at a distance of from half a mile to 1½ miles of the island. This being passed, a course may be steered for Devils point on the main land, after closely rounding which, a small vessel may stand direct for the town of Tuticorin, carrying soundings of 11 to 9 feet. Before passing Devils point, a depth of 2½ fathoms is found, sand and mud.*

Devils Point, close to which vessels must pass in entering Tuticorin harbour by the southern entrance, bearing S.S.W., and distant 1½ miles from the lighthouse, is a low sandy cape, with sparse bushes on it ; the shore, inland of it, is swampy and intersected by creeks. The channel, between the point and the islet of Krangi-tivo, has a width of only 3 cables' lengths.

LIGHT.—The obelisk, on which the light at Tuticorin is exhibited, is octagonal ; the light is *fixed,* at an elevation of 43 feet above high water, and is visible about 12 miles off from a vessel's deck. The town of Tuticorin bears W. by N. 2½ miles from the light.

OUTER ANCHORAGE.—The best anchorage in the roadstead is in from 5½ to 6½ fathoms, with the lighthouse from W.N.W. to W. by S., distant about 1¾ miles. During the months of August and September, when strong winds are invariably from the land, vessels may anchor in 5 fathoms, but should not approach closer than that depth, as a ledge extends from half a mile to one mile outside the islands, with uneven soundings of from 10 to 20 feet water on it.

In making the port at night, a vessel may anchor with the light bearing from W.N.W. to W. by S., about 2 miles off, where good holding ground

* *See* Chart :—Tuticorin Harbour, by Franklin, No. 67 ; scale, *m*=4 inches.

will be found, in 6 to 6½ fathoms. At 3½ miles, distance, on the same bearings, the ground is foul on pearl-banks. In approaching from the southward, the light may be kept about N.N.W., till within 3 or 4 miles, when the above anchorage may be selected.

When coming from the North, a vessel may keep the light bearing about S.W. till within 3 or 4 miles, when she must steer more out for the anchorage; but, in no instance, ought the water to be shoaled under 6½ fathoms, excepting with the bearings on for the anchorage, and then not under 6 fathoms.

In the N.E. Monsoon, vessels should lie with a good scope of cable out; as, although the seas are not heavy, they are sharp, and occasion a chain to jerk. The sea breeze, at this time, blows on to the reef; and a second anchor, with chain ranged, ought always to be kept ready for letting go.

In the S.W. Monsoon, which usually lasts from the middle of May to the middle of August, this port may be made without fear; for, although the winds are very violent, they are invariably off shore from West to S.W., accompanied by smooth water. At this time, vessels may approach the reef to 5 fathoms water, but should always have a stream anchor to seaward, as, occasionally during the lulls of the monsoon, a light air comes in from the eastward.

TIDES.—The tides are very irregular; the flood sets to the northward, and the ebb southward; past Devils point they run 3 knots an hour. Spring tides rise 2½ feet; neaps 1¼ feet. High water at full and change occurs at 1 h. 15 m.

GENERAL DIRECTIONS.—In the N.E. Monsoon, vessels from Europe, bound to Tuticorin, should keep the west coast of Ceylon in sight as far northward as Calpentyn, or until they can fetch across to Tuticorin. In going from Bombay or the Malabar coast at the same season, after rounding Cape Comorin, the Indian shore may be kept aboard till abreast of Manápaud point; a vessel may then stretch across to the Ceylon coast with advantage, and probably on the next tack to the north-west she will fetch Tuticorin.

In the S.W. Monsoon, when bound to Tuticorin, from whatever port they may come, vessels must sight and round Cape Comorin, and keep along the Tinavelly coast. Some few years since, it was considered a hazardous undertaking for vessels of any size to proceed far up the Gulf of Manár; more particularly during the S.W. Monsoon, when it was supposed to be impossible to beat out again. Later experience, however, has shown that no dangers exist that may not be avoided by ordinary care and attention; and that, as regards working to windward against the monsoons, no difficulty will be experienced if the instructions be attended to.

In the N.E. Monsoon, that is, from November to March inclusive, fine weather with land and sea breezes will be found to prevail on the Ceylon side of the gulf, where good anchorage may always be selected between Colombo and Chilaw, at 1½ to 3 miles off shore, in 6 to 9 fathoms, sand. Vessels, wishing to beat up during the first three months, November to January, ought therefore to keep over on the Ceylon side till they have advanced sufficiently far to make certain of their port, if bound to Tuticorin, as the breezes on the Indian coast, may be expected to blow steadily and strong from N.N.E., with a strong lee current.

In navigating the west side and head of the Gulf of Manár, great attention must be paid to the lead; and, unless they have a good pilot on board, or good charts, vessels should not shoal to less than 18 or 20 fathoms, below Manápaud, nor to less than 12 fathoms to the northward of that place. The currents are so irregular in their direction and velocity, that no reliance can be placed on their exact set.

In the S.W. Monsoon a ship, on leaving Tuticorin, ought to keep over on the Indian side till near Manápaud point, whence she will generally be able to fetch to windward of Colombo, and be clear of all dangers along the west side of Ceylon.

MOORAM-SHULLI-TIVO, nearly 2 miles South of Devils point, is the southernmost of the islets that front Tuticorin, and is also the southernmost island along the Indian shore of the Gulf of Manár. Numerous pearl-banks lie from 3 to 9 miles eastward of these islands. The greatest depth at low water, in the channel across the sandy barrier between this islet and the main land, is 13 feet, at the distance of 4 or 5 cables to the south-west of it. Northward of the barrier towards Devils point the water deepens.

From a short distance southward of this islet till abreast of Penacoil tope, there are occasional patches of rock found; but the anchorage is good in general, in Westerly winds, along this part of the coast in 3½ to 4½ fathoms, mud, between 1½ and 2½ miles from the shore.

PENACOIL, is a small fishing village, situated about one mile from the sea, whence it is approached by a creek, the mouth of which bears S.S.W. ½ W. 9½ miles from Tuticorin lighthouse. Penacoil is easily distinguished by the ruin of an old square-built church, with a scanty tope of palmyra trees on the beach to the southward of that building. In the daytime the high Ghauts are visible to ships navigating this coast; and there are some nearer hills, one of which, bearing about W. by N. from Penacoil, was called by old navigators Penacoil peak.

ANCHORAGE.—Off Penacoil, there is anchorage in 4 fathoms, rather more than one mile from the shore, with the tope, or plantation of trees,

bearing West ; where, with the wind at South-west to South, vessels will be protected by the Coilnapatam reef.

A natural deep basin, which is 4½ miles in length east and west, and averages 1¼ miles in breadth, extends to the eastward beyond the above anchorage ; the bottom is fine sand and mud in 7 fathoms on the western side (at the distance of 2 miles East of the Penacoil tope), and 18 to 20 fathoms on the eastern extreme, from which it suddenly shoals to 9, 8, and 7½ fathoms on a pearl-bank. When standing up the coast during the night, with a scant wind, this is good ground for ascertaining a vessel's position, as there is no spot like it between Paumben and Cape Comorin. From the outer part of this deep basin, the anchorage off Tuticorin bears N. by E., 9½ miles.

COILNAPATAM is a considerable town 4 miles South of Penacoil creek entrance; and Coilnapatam point is 1½ miles northward of the town. The coast is sandy, with cocoa-nut trees, and there are some hills a little way inland. Between the outer reef and the shore reef there is only water enough for coasting craft, but the outer reefs break the swell, and render the water much smoother inside.

Coilnapatam Reef. — This dangerous reef commences at 2½ miles N.E. by N. from the town of the same name, with 10 feet water on its northern extremity, and extends (with the exception of a break off the little Parwa village of Alendál) as far as Manápaud point. The outer edge lies from 1¾ to 2¾ miles off shore, and has, in heavy weather, a high surf rolling over it in 2½ to 3 fathoms, but ordinarily the sea only breaks on an inner ledge, in from 2 to 12 feet, from 2 to 4 cables' lengths within the former. Many small channels exist between the rocks composing the reef, of which the dhonies, or small trading craft, take advantage, but the channel inside is not good. The mark for the largest channel is the Periamália hill (the highest of the two most conspicuous, and often the only hills visible inland) anywhere between the two large trees at the town of Coilnapatam.

TRICHENDORE POINT is the next prominent point southward of Tuticorin, from whose lighthouse it bears S. by W. 17½ miles, and from Coilnapatam town South, 4 miles. The point is a low rocky bluff headland, covered with sand, and having a remarkable high dark pagoda situated on its extremity, which is seen in ordinary weather from 12 to 15 miles, and sometimes even at 18 miles from aloft. The town of Trichendore is situated at the back of the pagoda, and 1½ miles further northward, in the bight, lies Virandnapatnam, a town second only to Tuticorin in size and importance, inhabited by fishermen of the Parwa caste.

Trichendore Reef.—This is a dangerous reef projecting 3 miles to the

north-east from the point of that name, and affording some little shelter for small craft to the anchorage off the large town of Virandnapatnam, which is situated in the bay at 2¼ miles W.S.W. from the northern tip of the reef, to round which that town must be brought to bear S.W. by W., as, further northward, comes the foul ground of Coilnapatam reef.

Eastward of this reef the soundings regularly increase till, at 6 or 7 miles distance, the pearl-banks are found, little patches with 7 or 8 fathoms water, the surrounding water being from 1 to 3 fathoms deeper.

ALENDÁL.—Southward of Trichendore point, the foul ground extends about one mile from shore till abreast of Alendál village, off which place there is a small patch of good anchorage, at from 1 to 1½ miles off shore, in 3½ to 4 fathoms, mud, with the church bearing W.N.W., distant 2 miles; here a vessel is protected, during Southerly and S.W. winds, by the projecting part of a reef to the southward, which there stretches out to more than 3 miles from the shore.

Alendál Shoals.—Eastward of the above anchorage about 3 miles, there is one shoal patch of 3½ fathoms with 9 fathoms round it. Another shoal of greater extent and with less depth of water, viz., 2 and 2¾ fathoms, lies about 2 miles to the south-east of the above anchorage, and 6 miles N.E. of Manápaud point. Both these shoals are situated about 4 miles to the south-east of Trichendore point. A third shoal, with 4½ fathoms, bears E.S.E. 3 miles from the pagoda.

COILSINIPATAM is a town on the sea-shore, bearing S.W. by S. 7½ miles from Trichendore pagoda, and nearly 2 miles to the north-west of the tip of Manápaud point. Off this town, extending 4 or 5 miles to the north and east, there is a great extent of foul ground, over which there are heavy breakers in the N.E. monsoon, but it has many small channels which are only known and used by the native craft. The anchorage inside is very insecure, and subject to a heavy breaking sea during the prevalence of Easterly and N.E. winds. The principal town, in the bight which this reef partly protects, is Coilsinipatam, and the town of Manápaud is situated just to the south of it, and may be known by the ruins of a large church half buried in the sand, and the mouth of a small river, too shallow for internal navigation, opening into the bay to the north of Manápaud point.

MANÁPAUD POINT, a projection of the coast bearing S.S.W. ¼ W., 8 miles from Trichendore pagoda, is a high sandy promontory, based on rock, jutting boldly into the sea, and having a small white-washed church on its summit, visible in clear weather at 12 or 13 miles. The breakers extend 3 or 4 miles to the north-east of this point, and about one mile to the south-east.

Anchorage.—There is excellent holding ground in 5 fathoms, mud, to be found near the shore, between the towns of Manápaud and Periathullay, which are 5 miles apart. This anchorage is only available in the N.E. monsoon. In June, July, and August, the heavy sea which rolls in upon that part of the coast precludes the possibility of any vessel anchoring there; therefore, during these months, when the S.W. monsoon is strong, vessels should anchor off either Alendál, or Penacoil, where the coast trending more to the northward becomes a weather shore.

But if, in coming from the westward, the navigator passes between Manápaud point and its outer shoals, he must be cautious of the shoal patches off Alendál (*see* page 68), and not come within 5 miles of the shore in passing them, nor bring Manápaud point to bear to the southward of W.S.W., till the Trichendore pagoda bears N.W.

MANÁPAUD OUTER SHOAL.—This dangerous shoal has its nearest part at 5 miles from the point, and between them a depth of 12 fathoms is found; the same water is to be had all round this extensive shoal. On it are patches of 4, 5, and 7 fathoms. It extends E.N.E. and W.S.W., 10 miles, having an average breadth of one mile. From its centre, a tongue of the shoal projects in a northerly direction, the apex of this constituting its northernmost or inner danger, on which is $4\frac{1}{2}$ fathoms, sand; from this part Manápaud church bears N.W. by W., 5 miles, and Trichendore pagoda (seen in clear weather from above the deck) North, a little westerly, $10\frac{1}{4}$ miles. From the central shoal part, where there is 4 fathoms, sand, Manápaud church bears the same as above, distant 8 miles, and Trichendore pagoda N. by W. a little westerly, $12\frac{1}{2}$ miles; this latter mark, however, is too distant to be seen in any but the clearest weather.

There are many other patches with $5\frac{1}{2}$ and 6 fathoms water, over which a vessel might pass; yet the safest plan, when coming from the westward, sailing between the Manápaud shoals and the point, is not to bring Manápaud church to the westward of North till within 2 or 3 miles of the point, and then a course E.N.E. will take a vessel clear. The soundings off the shore, south of Manápaud, at one mile are 6 fathoms, and at 3 miles 9 fathoms, sand and mud.

But if the passage outside the Manápaud shoal be preferred, a vessel ought not to come under 15 fathoms, which will be 11 or 12 miles off shore, until she has passed Manápaud, when, with the church at that point and Trichendore pagoda in sight, her position cannot be mistaken. As, however, the soundings outside of the shoal are very scanty, the charts exhibiting no depths beyond one mile south of the central shoalest patch, no very definite instructions can be given.

The COAST from Manápaud takes a mean general direction of S.W. by W. for 20 miles to the prominent point which is one mile south of the village

of Ootaunkúdi, and was called East cape by old navigators. Northward of Manápaud the shore is low, but westward from that place towards Comorin it rises to the height of 100 or 200 feet in undulating sandy hills, and the tops of tall palmyra trees are apparent as emerging from them; the back-ground is mostly of a reddish soil, covered with palmyra trees and bushes, and rising gradually to the foot of the ghauts, which at Cape Comorin approach to within 3 miles of the shore. Numerous fishermen's villages and small white-washed churches line the coast, but landing in a ship's boat is at all times a difficult and dangerous operation.

The coast from East cape to Cape Comorin forms in a deep bight to the north of the latter, in which vessels can find considerable shelter from west winds, but the swell of the S.W. monsoon rolls round into it; therefore no attempt should be made to land in a ship's boat. The boundary between the Tinavelly and Travancore States is situated about 5 miles north-east of Cape Comorin.

East Cape is just to the southward of the village of Ootaunkúdi, and bears S.W. by W. a little westerly from Manápaud point, from which it is distant 20 miles. Northward of the cape a considerable bay is formed, where, in 4 fathoms, a small vessel may find some little shelter from westerly winds and their accompanying swell, which is still further broken by the prominency of the shore reef between Ootaunkúdi and Idingikári. This bay was known to former navigators as Cóvalum. The cape has trees on it, and near the town there is a tuft of trees elevated more than the other land; to the northward about 3 miles off there is the mouth of a small river.

Shoal.—The shore reef, between East cape and Idingikári, extends off a full mile and perhaps more; the latest chart shows that there is not a distance of 1½ miles between the reef and the 12-fathom sounding. This is probably the spot where H.M.S. *Thalia* is said to have seen breakers at three-quarters of a mile from her. Cape Comorin bore W. by S., (most probably the isolated conical mount was observed, distant 4 miles N.W. from the low cape, as the latter would have been too far off to be visible,) and the extreme eastern land bore N.E. by N. (probably the East cape.) She sounded, and shoaled her water suddenly from 11 to 3½ fathoms.

CAPE COMORIN, the most southern point of Hindostán, bears from East cape S.W. by W. ½ W., distant 15 miles. The native name of the town is Cania Cúmari, from which foreigners have given it the name of Comorin. On its south side, the cape has the aspect of a high sandy promontory, but on its east side there is high reddish ground. It rises in a gradual slope northward, and is covered on the eastern ridge with palmyra trees. A large white building, the choultri, is situated near the beach, with the British Residency 300 yards to the north-west of it. Off the south-east tip of the cape, there are two large rocks, with a small one

outside on which the sea breaks at all times with much violence; these rocks stretch to the distance of 2 or 3 cables' lengths from the shore; they are steep-to, and may, with a fair wind, be approached within 2 or 3 cables into 8 or 8½ fathoms water; but, with a scant wind, caution is necessary, as the current sets rapidly round the point, and may drift a vessel too near and into danger.

TIDES.—The flood sets eastward, and the ebb westward off the cape, but the tides are much affected by the ocean currents. The rise and fall is very little and irregular, the average may be stated as 2 feet, a mean between those of Cochin and Colombo. High water, at full and change, was found to be at 12h. 30m. in the month of May.

CHAPTER III.

TRAVANCORE AND MALABAR COASTS.—CAPE COMORIN TO MOUNT DILLY.

VARIATION, 0° 30′ to 0° 19′ East in 1865.

VESSELS bound to any port on the west coast of Hindostán, and to the Persian Gulf during the N.E. monsoon, from China, Australia, the bay of Bengal, or Europe, should sight Ceylon, and make the coast of India somewhere near Cape Comorin, and thence hug the coast to profit by the land and sea breezes; therefore the navigation of this seaboard (which has been generally, though erroneously, called the Malabar coast) is here described from south to north.

The coast from Cape Comorin takes a general north-westerly direction for nearly 300 miles to Mount Dilly. From the village of Cúmari to Alipee belongs to the rajah of Travancore; thence to Paliport (with the exception of the port of Cochin, under the British government) is the territory of the rajah of Cochin; above Paliport to Mount Dilly is the British province of Malabar.

The TRAVANCORE COAST from Comorin to Alipee is generally low and sandy, fringed with cocoa-nut trees, but patches of red cliffs of slight elevation here and there break the otherwise continuous line of sand. The Travancore mountains, though generally spoken of by navigators as a part of the Western Ghauts, are indeed separated from the latter by a low saddle of land, the Pálghát valley, which has proved a most useful feature in the railway communication between east and west coasts. The length of this southern mountain chain, extending from a few miles north of Cape Comorin to the valley of Pálghát, is nearly 200 miles. The west brow, overlooking the coast of Travancore, is, with little exception, abrupt; on the eastern side of the culminating range the declivity is in general gradual, the surface in many places being extensive table-land, sloping gently and nearly imperceptibly eastward. Such a conformation would seem to indicate a volcanic disturbance of the surface, the disruption having taken place along the western precipitous face. In the last half of the year many a cascade of great height is visible from seaward, pouring down the steep declivity of these ghauts, which present so vast and lofty a front to the violence of the S.W. monsoon.

The principal peaks of the Travancore Ghauts are as follows: Miandraghiri, between 3,000 and 4,000 feet, about 20 miles northward of Comorin, and Cuchy Mulla, nearly 5,000 feet, the same distance north-east of Trivandrum. Between these peaks the culminating range has a north-west direction, but afterwards trends a little eastward of North, more away from the coast; and its highest mountains, though loftier, are not so often visible at sea; they form the boundary between the independent state of Travancore on the west, and the British province of Tinivelly on the east. To the east of Quilon there are broad, high peaks, estimated at 5,000 feet above, and more than 30 miles from the sea.

The southern portion of the Western Ghauts, from Comorin to Pálghát (which run like a spine from south to north, thus forming the water-parting between the east and west coast rivers), being exposed to all winds from East, round by the South, to West, there is scarcely a day when rain-clouds may not be seen hiding for a time the summits of the high land: towards the vernal equinox (after which the air becomes saturated with moisture and hazy) the Ghauts north of Quilon up to Calicut can seldom be seen.

Midway between the above lofty summits of the Ghauts and the low sea-coast, the country has several hills of moderate elevation, useful as landmarks. Beginning from the south, mention may be made of the isolated conical mount, in lat. 8° 8′ N., and long. 77° 30′ E., near Cape Comorin, and taken as the cape by seamen when approaching the coast from the west. The next conspicuous peak is Marúvatúr, about midway between Miandraghiri and the Crocodile rock, and 10 miles north-west of the conical mount.

On the south-east of Trivandrum, and again to the north of that capital, hills, averaging about 400 feet, lie parallel to the shore, some 4 or 5 miles off. Near Anjengo there are a few low hills, but above that place extensive backwaters become the peculiar feature, overspreading great portions of the low tract of country.

CAPE COMORIN, the southern extremity of the peninsula of Hindostán, is a low sandy cape, with a small pagoda at its extreme point; and a little to the west of this is the British resident's bungalow with a flagstaff. About 2 cables' lengths to the south-east of the sandy cape is a sloping rocky islet high above water, with other rocks about it, on which the sea breaks. To the westward of the residency the shore of the cape is sandy and barren, but to the eastward it abounds with trees, amongst which, and 3 miles to the north of the pagoda, is Watakóta fort. The pagoda is a low white square building near the water's edge, half a mile to the north of which stands the village of Comorin, called by the natives Cania Cúmari, amongst cocoa-nut trees, with high reddish ground at the

back ; and half a mile farther north-east is another little sandy cape with rocks off it.*

The land of the cape rises from the sea with a gentle acclivity to the base of the nearest mount, which is of a sharp conical form, 1,400 feet above the sea, at 4 miles to the north-west of the pagoda. It is separated from the range of the Ghauts, which at its back rise in majestic sharp peaks, chained together, and forming a ridge which is in one with the cape bearing about North.

Approaching the coast from the westward, it must be remembered that the above-mentioned isolated conical mount can never be seen, even in the clearest weather, at a greater distance than 35 miles. Some prominent peaks to the north of it may be seen 50 and 60 miles, and the most southern visible one may be mistaken for the conical mount by ships passing at a great distance. The most likely one to be mistaken for it is a mountain 10 miles to the north-west of it, and called Marúvatúr ; this is more than 2,000 feet high, and bears from Cadiapatam point N.N.E. $\frac{1}{2}$ E. distant 9 miles. Another peak, called Miandraghiri, between 3,000 and 4,000 feet above the sea level, bears N.E. by N., distant about 11 miles from Marúvatúr.

SOUNDINGS.—The bank of soundings extends 50 miles off shore to the south and west of Cape Comorin. At the distance of 8 miles from the shore south of the cape there are 20 fathoms ; but farther to the north-west, as far as Quilon, that depth is between 4 and 5 miles off shore, except in the vicinity of Ruttera, where 20 fathoms will be obtained only 2 miles off land.

Near Comorin, and by the Crocodile rock, casts of 10 fathoms are found nearly 3 miles from the main land ; but generally between the cape and Enciam there is that depth at 1 and 2 miles distance. Between Enciam and Anjengo 10 fathoms is about one mile from land. The bottom is sand and shells, with exceptional rocky casts.

To the eastward of Cape Comorin the bank of shoal soundings extends further off shore, and has more overfalls.

Wadge Bank (where a captain of that name reports having once found 7 fathoms, least water) is a shoal of small extent on the bank of soundings, 36 miles S.W. of Cape Comorin. It was examined in 1861, but not less a depth than 14 fathoms was found. This is probably that bank described by Horsburgh, as "a great way out from Cape Comorin, and abounding with cod, where some ships have caught considerable

* *See* Chart:—India, West Coast, Cochin to Cape Comorin, No. 2,738 ; scale, $m = 0 \cdot 08$ of an inch.

numbers of those fish, but it appears to be of small extent, and little known."

CADIAPATAM POINT, bearing W. $\frac{3}{4}$ N. 14 miles from Cape Comorin is steep, rather high, and of a very red appearance, with a few trees near its extremity. A heavy surf prevails all along this part of the coast, between Comorin and Cadiapatam, and only catamarans are used by the natives; no ships' boats should attempt landing.

CROCODILE ROCK.—Bearing S.W. from the point nearly 3 miles lies this dangerous sunken rock, close to which are depths of 14 and 16 fathoms, and 20 fathoms half a mile outside. A small part of this rock appears sometimes above water, but it does not break at all times, nor is the break visible at high water when the sea is smooth. At night do not approach it under 25 fathoms water.

Between the Crocodile rock and Cadiapatam point lies the rocky islet Adumdah, and $1\frac{3}{4}$ miles to W.N.W. of this islet is another called Kotah. Both are surrounded by sunken rocks and foul ground, but there is a channel between the two, and between each and the Crocodile rock. Kotah bears from the Crocodile N.N.W. nearly 2 miles.

COLÁCHUL.—This place is on the shore just half-way between Cadiapatam and Enciam islet; off it there are several rocks above and below water. At the village of Coláchul, troops sometimes embark in the fine season, the outlying rocks forming a partial breakwater, within which landing is comparatively easy.

There is a remarkable tree on the undulating ground of Aunipauri hills, elevated more than 250 feet above the sea, bearing from Enciam islet N.E. by E. $\frac{1}{2}$ E. $4\frac{1}{2}$ miles, and about 4 miles northward of Coláchul village.

Anchorage.—Anchor with the tree N. by E., and the highest part of Cadiapatam red point E.S.E., in 11 or 12 fathoms water, which position will be $3\frac{1}{2}$ miles to the north-west of Kotah rocky islet.

ENCIAM ISLET bears from Cadiapatam point N.W. by W. 10 miles; this islet is rocky, has a church on it, and lies about half a mile off the sandy shore; rocks, above and below water, project from it to a small distance. A little to the east of the islet the steep land near the sea has a red appearance; indeed there are numerous patches of red land between Comorin and Quilon, but cocoa-nut trees fringe the most part of the coast.

A depth of 13 fathoms will be found close to the outer rocks off Enciam; at night a vessel should not shoal under 20 fathoms, which depth is only 2 miles from the rocks.

CÓVILUM, or Ruttera point, bears from Enciam islet about N.W. ¼ W. 16½ miles. The coast between them, except near Cóvilum, is sandy, nearly straight, fronted with cocoa-nut trees, and safe to approach. Cóvilum is a piece of low level land terminating in a bluff cape higher than the contiguous coast, but it projects very little, and has a building upon it; there are three little projecting points close to the south-east of it, and at the distance of 3 miles another point, one mile to the east of which is the village and backwater of Karúchel.

Horsburgh describes a point called Veniam as 7½ miles to the south-east of Ruttera point, and "formed of steep bold land, or reddish cliffs, considerably elevated, having on the north side a small river, and a village at the northern extremity of the high land that forms the point." This is evidently a description of the Colatúr hill and the village of Powaur as seen from the southward, from which point of view the hill would look like a point projecting northward if the vessel was far enough off to dip the trees. The coast line is, however, hereabouts all sandy, and fronted with cocoa-nut trees. Colatúr hill bears from Enciam islet N.W. ¼ N. distant 8 miles.

TRIVANDRUM, the capital of the independent state of Travancore, and the seat of the British residency, is 5½ miles N.N.W. of Cóvilum. The town is of considerable size, having its greatest length north and south; on the latter extremity stands the fort, about half a mile square, on ground elevated 100 feet above the sea. The Rajah's palace, within its precincts, is a large handsome edifice in the European style; it is a little way inland, more than 2 miles from the sandy beach of Pondera, or Pootoray. The Trivandrum Observatory is on a hill, more than 2 miles north of the capital, and 200 feet above the sea; its two white domes are very conspicuous, but having been established since the province was surveyed, its position is not accurately defined.

Pondera, off which vessels communicating with Trivandrum should anchor, has a flagstaff on the sandy beach, which bears N.W. and is 5 miles from Cóvilum, and is 2 miles to the south-west of Trivandrum fort. No ship's boats should attempt communication with the shore, for there is generally a heavy surf in the N.E. monsoon. The coast is sandy, with cocoa-nuts and other palms.

Anchorage.—As the shore is deep-to, a vessel should anchor in 12 fathoms, sand, half a mile from Pondera flagstaff bearing N.E. and in line with the Observatory.

Mountains.—Inland of Trivandrum the Ghauts are of great elevation; Cúchi Mulla, the highest peak, (called sometimes by early navigators, Anjengo peak,) is more than 4,000 feet high, and bears N.E. by E. ½ E., distant 21 miles from the beach by Pondera flagstaff. Between this high

range and the coast some small hills appear, the most remarkable of which is Naimun hill, or Makúnamulla, a regular sloping round mount about 600 feet above the sea, called by former navigators Brinjall hill. This hill bears East from the anchorage off Trivandrum, and being only 5 miles from the sea, is visible at a considerable distance from the southward, and from Anjengo roadstead. There are little white churches in almost every village along this coast.

Between Ruttera point and Anjengo, the land, at the back of the cocoa-nut trees which fringe the coast, is hilly and undulating.

ANJENGO flagstaff bears from Cóvilum, N.W. ½ N., 20 miles; but, as the fort and few houses (that are visible through the trees) are low, this place is not easily distinguished from even a short distance. A church with a white front will be seen on the beach 2 or 3 cables' lengths to the north-west of the fort, and a bungalow on the hills 2 miles north of it.

The anchorage off Anjengo under 10 fathoms is foul rocky ground; but outside of that depth the bottom is sand and shells.

There is an admirable system of inland communication by canal and natural backwater, in fast-pulling boats, from below Anjengo through Quilon and Alipee to Cochin, and 50 miles beyond.

There is some red table-land about 4 miles to the north of Anjengo, which may denote the approach to it in coming from the north; this and other similar table-land along this coast, being much higher than the cocoa-nut trees, when seen from a ship's deck at a greater distance than 7 miles, give the mariner an idea that these red cliffs come down to the water's edge; whereas the shore is all sandy from Cóvilum to Quilon.

QUILON, or properly Koilon (in ancient maps Coulán), bears from Anjengo N.W. ½ N. 18 miles. A small British force is stationed here; the ground on which the cantonment stands rises by a gentle ascent from the sea, above which it is about 40 feet. Between Anjengo and Quilon the coast forms a bight, which is deepest about 5 miles south-east of the latter place, at which spot an extensive backwater makes a gap in the line of trees fronting the coast.

Quilon is a projecting part of the coast, and the outer point, which is called Tangachéri, on which are the flagstaff and master attendant's house, amongst high cocoa-nut trees, is slightly elevated above the adjoining land. One large bushy round tree above the rest may be seen beyond 10 miles from a ship's deck; the flagstaff cannot be seen so far off unless the colours are hoisted. This point is about 2 miles west of Quilon cantonments, where another flag is hoisted by the commandant of the troops.

The coast for more than 2 miles north of Tangachéri flagstaff is rocky and slightly elevated, having half way along it a white church, which in the afternoon shows well.

Tanchagéri Reef.—Quilon, besides being a very projecting point of the Travancore coast, is rendered still more unsafe to approach by the bank of hard ground, called the Tangachéri reef, extending 1½ miles to the south-west, and 3 miles to the west of the point, and 6 miles along the coast to the northward. The bank should not be approached under 13 fathoms water by day, or 17 fathoms at night, as it is deep-to.

At night, in standing to the northward along the coast with a fresh land-wind, be careful to increase the distance from the shore as the vessel approaches Quilon.

ANCHORAGE.—To the south-east of the reef the coast forms a bight, where ships may anchor off the town and military station of Quilon, in 5 or 6 fathoms, sand, with Tangachéri flagstaff bearing N.W. one mile distant; but as there are rocky overfalls a little to the east of this position, and the master attendant's boat will always come off, it is better to wait for that officer to berth the ship.

During the fine season from November to April, trading or trooping vessels can lie close inshore in safety. The point and reef shelter this anchorage from north-west winds; but if the weather is cloudy and unsettled, it will be prudent not to place the ship too close to the shore.

Soundings.—The bank of soundings off Anjengo extends 25 miles from the main; off Quilon 28 miles; off Alipee 30 miles; and off Cochin 35 miles.

Off Quilon point there are 20 fathoms at 5 miles off shore; but farther northward that depth will be found further from the coast: off Alipee there are 20 fathoms at 12 miles distance, and off Cochin the same depth at 16 miles.

There are 10 fathoms only one mile off Anjengo, but further northward that depth is 2 miles off shore; abreast Quilon point there are 10 fathoms on the foul ground 3 miles from land; to the west of Iviker river 4 miles from land, and so gradually increasing its distance, until at Alipee there are 10 fathoms as far as 8 miles from the coast; above this latter place the 10 fathoms line runs N. ½ W., again approaching the coast, until off Cochin it is 5½ miles from land.

Thus it will be seen that the bank, of such soundings as the hand-lead will give, extends further off Alipee than off any other place yet described.

To the north of Iviker, as far as Calicut, the soundings are all regular, and the bottom mud; whereas below Quilon to Cape Comorin it is sand, and rocky in many places.

AIBIKA, or Iviker river mouth is about 4 miles north-west of Quilon; the entrance is very shallow, with rocks off it, and patches of foul ground out to 7 fathoms, which depth is found nearly 3 miles from the shore. A large ship, taking in cargo here, must anchor well out in 6 or 7 fathoms.

There is here some export trade of timber, pepper, ginger, cardamoms, lac, and turmeric. The bar of the river has little more than one fathom at high tide; within the entrance, the area of shallow water is very great, and there is canal communication with Cochin to the north, and Trivandrum to the south.

The coast from Iviker river to Cochin is all sand, and fringed with cocoa-nut trees. The town of Purcaud or Porca, lying 9 miles south of Alipee, has a considerable trade in coir, timber, pepper, &c. The sea-coast of the Travancore Rajah's dominions terminates about 10 miles south of Cochin.

ALIPEE, or Aulapolay, the principal seaport of the Rajah of Travancore, bears N.N.W. 40 miles from Quilon point. The coast between, except near Tangachéri, is sandy, and nearly straight; but 10 miles north of Quilon there is a slight indent, which does not, however, amount to one mile from a straight line drawn between the two places. The shore is safe to approach into the depth of 5 fathoms, mud; but it must be remembered that towards Alipee this depth is found nearly 3 miles off.

Alipee is a projecting part of the coast of Travancore, but what makes it a safe port, where trade is carried on all the year round, is the peculiar softness of its mud bank, which is so stirred up by the swell in a fresh breeze as to break the activity of the waves. During the S.W. monsoon, although the surf breaks on the shore to the north of this place, and the sea is white with foam outside, there is at Alipee a large extent of smooth water, on the outer part of which a vessel may conveniently anchor in $4\frac{1}{2}$ fathoms, and keep up a communication with the shore. In the fine season, a vessel, not drawing more than 18 feet water, may anchor in 4 fathoms, or less, the bottom being such soft mud. Hence it was called *Mud Bay* by the earliest navigators.

Vessels anchor with the flagstaff bearing about E. by N.; but as the mud bank changes its position, advice should be taken from the master attendant, whose boat is sure to communicate with every ship. This place has a considerable export trade in teak-timber, coir, betel-nut, and pepper.

When, during the S.W. monsoon, trade cannot sometimes be carried on at Cochin, the port of Alipee is always available; and the backwater and canal communication between these two places is an immense advantage.

LIGHT.—Alipee has a flagstaff which shows above the trees, and near it, a new lighthouse of red brick colour, 85 feet high. It has a *revolving* white light, attaining its greatest brilliancy every *minute*. The light is of the second order, elevated 100 feet above mean sea-level, and should be seen in clear weather 15 miles.*

* *See* Chart:—Cochin and Alipee, No. 65; scale, $m = 9$ inches.

The COCHIN COAST from Alipee to Paliport is all low and sandy, with cocoa-nut trees, having no elevated land whatever near the sea. The highest Ghauts are nearly 50 miles inland, though several spurs, with remarkable hills, stand between them and the sea, but none near enough to be distinguished, except when the weather is clear. The Anamullay mountains stand in British territory, on the east side of the province of Cochin, and to the south of the Pálghát gap; they furnish good but small teak timber for ship-building, which is brought to the sea-coast at Ponany.

Mountains.—The highest peaks of the Anamullay range are upwards of 6,000 feet above sea level, but nearly 50 miles inland. Colungode bluff, the north-west extreme of these mountains, estimated at 5,000 feet high, is a remarkably steep bluff facing the north. It is about 40 miles E. ½ N. of Chowghát, and makes the southern boundary of the Pálghát gap, through which the Ponány river flows, and the Madras railway now passes, and through which the land winds blow so fiercely between November and February. This remarkable gap, more than 4,000 feet lower than the hills on its north and south, is on the meridian of 76° 45′ E., and between the parallels of 10° 33′ N., and 10′ 52′ N. In the fine weather of the N.E. monsoon, the Colungode bluff is very conspicuous, but in the hazy weather, after February, it is seldom seen.

COCHIN flagstaff and light, bearing from Alipee N. by W. 29 miles, are in lat. 9° 58′ N., long. 76° 14′ E., or 3° 26′ E. of Bombay observatory. This port belongs to the British Government, and has a master attendant, a magistrate, and pilots.* The English territory is very limited, and all on the south side of the river entrance. The adjoining land belongs to the Rajah of Cochin. The British Resident or Commissioner has a large house on Balgotti island, nearly 2 miles N.E. by E. of Cochin. There are many English and Dutch merchants here, with a Government medical officer and hospital, and a custom house.†

The land at the back of Cochin is all low; and although the houses on the sea face of the town are white, they do not show well except in the afternoon; but the flagstaff is high above the trees and houses, and easily perceived with a telescope, as signals are always made when ships are in sight.

The bar at the river's mouth is a narrow strip of sand having 13 feet on it at low water, but the rise and fall being only 3 feet at spring tides, pilots will only take in vessels drawing less than 14½ feet. The bar is marked by two buoys, the south one chequered and pear-shaped, the

* *See* Chart:—Cochin and Alipee, No. 65; scale, $m = 9$ inches.

† *See* Chart:—India West Coast, Viziadroog to Cochin, No. 2,737; scale, $m = 0{\cdot}08$ of an inch.

northern a dull white spire-buoy. The best channel over the bar does not always remain at the same spot.

There is at times a surf on the bar, occasioned by the strong ebb running out against the sea breezes when there is any swell outside. Strangers ought, therefore, in running for the river in their boats, to be careful to keep in the proper channel, as several accidents have happened to boats crossing the bar after dusk. The river inside is deep, 7 to 9 fathoms are found abreast of the flagstaff and building yards; vessels are snugly berthed there by the master attendant, and generally load at a pier.

Supplies.—Cochin is an important shipbuilding depôt, and repairs of any nature to sailing vessels can be executed; but teak timber is not so cheap or plentiful as formerly, though other useful woods are procurable.

Water, poultry, sheep, pigs, and rice and other provisions in moderation may be procured; but the water of this place is not recommended, unless the supply comes in boats from Alwye, a town several miles to the north-east of Cochin.

LIGHT.—A *fixed* white light is exhibited from sunset to sunrise on the flagstaff surmounting an old church tower at Cochin. It is elevated 114 feet above the sea level, and can be seen 14 miles off; but when the topmast is struck during the S.W. monsoon, the light is only 62 feet above the sea, and cannot be seen farther off than 12 miles.

ANCHORAGE.—Vessels should anchor off Cochin with the flagstaff or light E. by N., in 5 or 6 fathoms, mud, about $1\frac{1}{2}$ miles off shore. They should not come under 6 fathoms in the S.W. monsoon, as a heavy swell then rolls in.

TIDES.—The stream of tide is very strong, and its times of change are very irregular, owing to the evaporation from, or the fall of rain upon, the immense area of the backwater to which the Cochin river mouth is the entrance and outlet.

It is high water, full and change, between 1h. and 2h.; ordinary springs rise $2\frac{1}{2}$ feet, neaps $1\frac{1}{2}$ feet; but sometimes the water remains at the same level (about its mean level) during a whole day by the custom house tide-gauge. This peculiarity may be attributed to the great evaporation from the immense backwater of Cochin, as stated above and at page 8; but it is believed that there is a little more rise and fall on the bar, and on the adjacent coast, than inside the river: extraordinary springs rise a little more than 3 feet. Night tides are highest all along this coast from November to March, and day tides from May to August; in the other months they are about equal.

At the anchorage abreast the bar the ebb sets westward; but the tendency of that tide is to the north-west, its racing over the sand-banks

on the north side of the river entrance producing heavy breakers there always.

PALIPORT RIVER.—Cranganore, or Kodungalore, where the Dutch had a fort and factory, lies on the north side of, and 2½ miles within the mouth of a river called Paliport, the entrance to which bears from Cochin N. by W. ½ W., 14 miles. Between these two places is an extensive soft mud bank, which (like that off Alipee) shifts its position, also rendering several portions of this shore free from surf, and consequently safe landing places. At 5 miles south of Paliport this soft mud bank, having little more than one fathom on it, extends nearly 3 miles to seaward of the cocoa-nut trees.

The river has a bar, and is only available for small coasting craft. The times of high water, and the rise of tide, are almost the same as at Cochin, but more regular; and the rise and fall is a little greater.

COAST of MALABAR.—The south extreme of the British province of Malabar is just above Cranganore, and its northern limit is Kuvoy, about 6 miles north of the little cape of mount Dilly. It seems necessary to explain this; for navigators, being in the habit of calling the whole seaboard the Malabar coast, from Bombay to Cape Comorin, are liable to be misunderstood by the natives and residents in India.

The Malabar coast in its southern portion, from Paliport to Beypúr, is wholly devoid of conspicuous landmarks, being low and sandy, with cocoa-nut trees; Beypúr, the terminus of the Madras railway, has some little hills at its back, and above it to Mount Dilly the coast is bolder, being composed of sandy bays, interrupted here and there by slightly elevated rocky points. Mount Dilly is a remarkable headland, whose summit is 850 feet above the sea, in reality an island, though separated by only a narrow creek from the low and sandy ground which fills up the intervals between the headland and the laterite table-land of Pyangádi, which latter is less than 100 feet in elevation at a distance of 2 miles from the mount, and gently rises towards the Ghauts, but does not attain to the same elevation as Dilly till a dozen miles from it.

The Kundah range of Ghauts approach the sea between Tellicherry and Calicut, and are higher here than on any other part of the west coast. The highest and most remarkable, called the Camel's Hump, about 7,000 feet above the sea level, stands in a north-east direction more than 20 miles from Calicut. The Wynád range at the back of Tellicherry has several very conspicuous and beautiful peaks, the most western standing prominently forward only 10 miles to the east of that sea-port; to the northward of them the high land recedes from the coast, and the valley of the Billipatam river fills the space to the mountains of Coorg, which, though of great elevation, are situated far from the sea.

CHITWYE (at the entrance of a river, now usually called Chowghát, from the principal town, about 3 miles north of the village of Chitwye), bears from Paliport N.N.W. 22 miles. Small coasting vessels only can enter this little river at high water.

The sea face of this part of the coast is all low and sandy, fringed with cocoa-nut trees, amongst which houses are visible at intervals. At the distance of 15 miles East of Chowghát is the base of the mountains; but off that place it is difficult to make out any particular peak. There is a little round red hill about 8 miles north-east of Chowghát, about 250 feet high, with a tree on its top. About 18 miles to the E.N.E. of Chowghát is a range of hills intermediate between the Ghauts and the coast; the south-east extreme is the highest, and more than 1,000 feet above the sea, and like a porpoise's back, rather abruptly terminating on the south.

PONÁNY RIVER entrance, N.N.W. ½ W. 17½ miles from Chitwye, having a bar with only 7 feet at ordinary low springs (when the rise of tide is only 4 feet) is only available for small coasting craft. The depôt of teak timber from the Anamullay forests is on the south side of this river, half a mile from the entrance.

There is no shoal off this river, as stated in old books of direction. A vessel may anchor in 5 fathoms, mud, with the point which forms the south side of the entrance, where the town is, bearing E.N.E.; this position will be rather less than one mile west of the bar.

Approaching from the southward, the tree point on the south side of the river is conspicuous, and the extensive backwater makes a large gap in the line of trees. About 9 miles north-east of Ponány there is table-land about 300 feet high, with a few scattered trees on its summit. The hill called Dolphin's head is 18½ miles N. by E. ½ E. of Ponány; and the Sisipára range of ghauts, about 6,000 feet high, are 36 miles N.E. by E.

Tanore is a town of considerable size on the sea-shore midway between Ponány and Beypore. A tuft of trees will be seen on table-land about a mile to the north-east of the town.

BEYPORE RIVER mouth, bearing N. by W. ¼ W. 23 miles from Ponány, has a bar, the passage over which is 1½ cables' lengths W.N.W. of the rocky islet on the south side of entrance. This islet is about 30 feet high, and there are rocks above and below water to the south of it; the railway company have placed a large board between 2 posts on it as a guide to ships; and there is a flagstaff on the coast abreast the islet.

None but small vessels can enter this river, as the bar has only 6 feet on it at ordinary low springs, when the rise is but 4½ feet. A vessel may anchor in 5 fathoms, mud, 1½ miles off shore.

Beypore is now become a place of importance as the terminus of the Madras railway; but being so close to Calicut, and having no dangers near the shore except the rocks which are visible, the lighthouse of Calicut is made to answer for both places. There is a good landing place for boats on the east side of the Châlium rocks, which (at low water when the sea is rough and the bar of the river unsafe to cross) make a still-water harbour during N.W. winds. Boats should pass close round the south end of these rocks where they rise several feet out of the water and are deep-to.

Two miles up the river, on the north bank, there is an extensive establishment, where castings of a considerable size, and other iron works are executed.

Châlium is the proper name of the town on the south side of Beypore river entrance, where the railway terminus is situated; it is low and woody, but at the back the land rises gradually. Kolahcoon, or two-tree hill, bearing S.E. by E., and distant about 3 miles from the river mouth, is about 200 feet above the sea.

Oorutmulla, the Dolphin's head, is a wooded hill about 900 feet above the sea, bearing E. by S. $\frac{1}{2}$ S. distant 13 miles from Beypore: it shows well when seen over Calicut, or bearing S.E.; but when seen at the back of Tanore, or bearing N.E., is not at all a good landmark.

CALICUT, bearing N. by W. $\frac{3}{4}$ W. 6 miles from Beypore, has a lighthouse, a white stone column 105 feet high, standing on the sandy beach a few yards north of the custom-house. It is a prominent mark from seaward in the afternoon; but is scarcely distinguishable even with a telescope in the morning. The same may be said of the town, which covers a good extent of the beach, but the houses are much hidden by the cocoa-nut trees.

Calicut has a large trade in pepper, coffee, cardamoms, rice, coir rope, timber, &c. The merchants find it more convenient, when the sea breezes are strong, to load from the beach abreast of the hill houses, $2\frac{1}{2}$ miles north of the lighthouse, where there is always less surf than opposite the town. Large kótias and patimars are built on the beach $1\frac{1}{2}$ miles south of the lighthouse, by the entrance of Calicut river or creek, where the shore is also smooth, being partially protected by the Coote reef.

The houses of the English authorities amongst trees on little hills (about 200 feet high), and $2\frac{1}{2}$ miles north of the lighthouse, form the best landmarks for Calicut; and vessels should anchor in 5 fathoms, mud, with those houses bearing N.E., or the lighthouse East, as it is all foul ground south of that line even out to 6 fathoms. There is also a patch of rocky ground with 4 fathoms least water, having 6 fathoms, mud, all around it, bearing W.N.W. distant $3\frac{3}{4}$ miles from the lighthouse.

Calicut Reef, on which the sea breaks in one part almost always where there is only 2 feet at low water, is of irregular outline. This shoal patch of 2 feet is in its centre, and bears from the lighthouse S.S.W. ½ W. 1¼ miles, and is distant 6 cables' lengths from the nearest shore abreast. The south extreme of this reef (which is generally called the *Coote* reef, after the late E.I.C. sloop of war which was lost there) lies 2 cables' lengths to the southward of the centre breakers. To the south and east of the reef the bottom is soft mud; and there is a considerable extent of anchoring ground for small coasting craft in 2 and 2½ fathoms at low water, partially protected from N.W. winds by the reef.

A black *buoy* to mark the west extreme of this reef, and as a guide to small coasting vessels, is moored 2 cables' lengths W. by N. from the shoalest part, and 1¼ miles S.W. by S. from the lighthouse. Seaward of the reef are numerous dangerous rocky patches, but none have less than 2 fathoms on them, and this foul ground extends more than 2 miles off shore. One patch of 13 feet at low water bears S.W. ¾ W. 1¾ miles from the lighthouse, and another with a similar depth S.S.W. ½ W. rather more than 2 miles.

LIGHT.—The lighthouse exhibits at 110 feet above the sea level a *fixed* white light, visible in clear weather at 12 miles. It is not lighted in the S.W. monsoon, from 20th of May to 10th of August.

Tides.—It is high water, full and change, at Calicut and Beypore at 12h. 15m.; springs rise little more than 4 feet, but extraordinary tides as much as 5 feet; neaps rise 2½ feet.*

ASPECT of COAST.—From Ponány to Calicut and onwards to Cotta point the coast is low, sandy, and fringed with cocoa-nut trees, with red laterite hills at the back. About 10 miles inland of Calicut are isolated hills about 800 feet high. The best distinguishing mark for Calicut in the morning is the house amongst trees on the hill more than 2 miles north of the lighthouse; in the afternoon the white column of the light house shows well 10 miles off.

Mountains.—The Camels Hump, or Wavutmullay, about 7,000 feet above the sea level, (the culminating peak of the Kùndah mountains which stand 20 miles westward of the Nilghiri range,) bears from Calicut lighthouse N.E. by E. ½ E. 23⅓ miles. It may be seen in clear weather, as soon as a vessel is on the bank of soundings; but in the hazy weather of March and April it is frequently indistinct from the anchorage off Calicut. The south extremity of the Kúndah range is rather abrupt, the mountains thence receding far to the eastward.

* *See* Chart:—Calicut, No. 64, scale *m* = 2 inches.

Twenty miles E. by N. of Kuddelur point is the mountain called Tanote Mullay, between 4,000 and 5,000 feet above the sea; and 12 miles south-east of this is the Camel's Hump.

The Dolphin's head, Oorutmulla, bearing S.E. by E. from Calicut, distant 17 miles, shews well to a vessel coming from the north. To the north of Calicut 3½ miles, is a small rocky islet 2 cables' lengths from the shore, and one mile further north is the little bay of Padiangády below the rocky cape of Eliatúr: this cape is quite low, but sand-hills at the back give a little elevation to the cocoa-nut trees on this point.

Koilundy is a considerable town in the bay, 12 miles N.N.W. of Calicut. The bottom being here soft mud, the shore is free from surf, and landing is easily effected in ships' boats. East and north of Koilundy the land is hilly and undulating.

Kuddelur Point, bearing N.W. by N., and 15 miles from Calicut, is prominent, but a dangerous reef extends off it, which, however, furnishes good shelter for small vessels from North-west winds in Koilundy bay, east of it. The foul ground of this reef extends in a radius of 2 miles to the south and west of the point. There is a large round tree above the cocoa-nuts over the point, and the hills rise gradually from it to the north-east.

TICOTTAY POINT, a low rocky point, off which foul ground extends nearly 2 miles and rocks dry at low water to some distance, is one mile north-west of Kuddelur. Early navigators named this cape Cotta point. Vessels bound northward from Calicut roads at the setting in of the S.W. monsoon must remember that a north-west course made good will barely clear the reefs off Cotta point.

SACRIFICE ROCK, or Kunáli, bears from Calicut lighthouse N.W. 20 miles, and from Kuddelur W. by N. ½ N. 6 miles. It is of granite, 40 feet above the sea, and, having a white appearance from its being covered in patches with birds' dung, may be seen 10 miles off in clear weather. By the natives of Malabar it is called Bilicullor, or, the white rock. It lies in the line of 11 fathoms soundings, and there are 15 fathoms 2 miles from it. The channel between the rock and the main is quite safe, but a vessel should not shoal under 7 fathoms towards the Ticottay reef.

To the north-east 5½ miles from Sacrifice rock there is the mouth of a small river which leads by backwater nearly to the town of Wuddakurray, about 2 miles north of the entrance. There is a remarkable little round hill about 250 feet high, called Nimanár, on the south bank of this river, bearing from its entrance E. by S. one mile.

WUDDAKURRAY is a town of importance, bearing N. by W. ½ W., and distant 8 miles from Ticottay point. At the back of the town and on to Cannanore there are pretty undulating hills about 400 feet high; and the Wynád range of mountains to the eastward have remarkable and lofty peaks, which make this the most beautiful part of the Malabar coast.

MAHÉ fort flagstaff bears N.N.W. 15 miles from Ticottay point, and North 12½ miles from the Sacrifice rock. This is a French settlement, of but small extent, at the mouth of a little river, off which are sunken rocks: ships' boats should not attempt to run in till they have examined the passage, which is very narrow.

The land at the back of Mahé and Tellicherry consists of detached hills, on which are old forts and houses.

Vessels may anchor off Mahé in 5 fathoms, mud, with the flagstaff E.N.E., and 2 miles from the shore.

TELLICHERRY flagstaff in the fort bears N.W. and is nearly 4 miles from Mahé flagstaff. The fort, in which are situated the gaol and hospital, is built on rising ground 100 yards from the sea, and about 40 feet above its level. At half a mile south-west of the flagstaff is a ridge of basalt rocks lying parallel with the coast for 2 cables' lengths; between them and the shore are detached rocks, above and below water, but they only afford shelter to the landing-place at low tide during North-west winds. Within and on the north side of the ledge of rocks fronting the fort, small vessels have been known to be moored head and stern during the S.W. monsoon.

Green Island, at 2½ miles N.W. by W. of Tellicherry flagstaff, and 2 or 3 cables' lengths from Durmapatam point, is surrounded by rocks and they are scattered over the whole space between this island and the Tellicherry rocks. Durmapatam old fort is one mile within the point, and about 200 feet above the sea. Boats sometimes bring their cargo to ships out of the little river east of Durmapatam.*

Trade.—A considerable and increasing trade in coffee now goes on at Tellicherry; other articles of commerce are pepper, cardamoms, ginger, arrowroot, cinnamon, rice, and sandalwood; good water and other refreshments on a small scale may be procured here; small native boats bring much coir yarn to this place and Cannanore from the Lakadivh islands, taking away rice in exchange. There is a custom-house at Tellicherry, and a Government medical officer; several English merchants are also settled there.

* *See* Chart:—Durmapatam Island, No. 796; scale, *m*—3·1 inch.

The population is about 20,000, the majority of whom are Moplahs, or Muselmín ; the rest Brahmins and Tiars, with a few Roman Catholics.

LIGHTS.—Two vertical *fixed* white lights, elevated respectively 140 and 104 feet above the sea level, are shown all night throughout the year from the flagstaff at Tellicherry. In clear weather they are visible from a distance of 12 miles. The high light, in the S.W. monsoon, is lowered to 112 feet.

ANCHORAGE.—Large ships must anchor well out in 6 or 7 fathoms, when there is a chance of unsettled weather ; but in the fine season, when only trade is carried on along this coast, vessels may anchor in 5 fathoms, soft mud, with the flagstaff N.E. and Green island N.N.W., rather more than a mile from the rocks.

TIDES.—It is high water, full and change, at 11h. 40m., springs rise 5 feet, but extraordinary tides 6 feet ; neaps rise 3 feet.

CANNANORE fort flagstaff bears from Tellicherry fort N.W. $\frac{1}{4}$ W. $9\frac{1}{4}$ miles. The point is 2 cables' lengths W.S.W. of the flagstaff, and has a reddish appearance. To the west of the fort are the British barracks, between which and the sea are 3 or 4 cocoa-nut trees overhanging the sea; north of these are several houses amongst trees on slightly elevated red cliffs about 40 or 50 feet above the sea. To the N.N.E. of the flagstaff is the English church on elevated ground, and other houses and trees beyond. Nearly 3 miles north of the fort is the collector's cutcherry, a thatched building on elevated ground 250 feet above the sea.

The houses of Cannanore cantonment extend along the cliffs some distance northward of the fort, and $4\frac{1}{2}$ miles north-west of it there is a projecting rocky point of elevated red land with high cocoa-nut trees ; and three miles further north-west is the mouth of Billiapatam river,* down which excellent poon spars for ships' masts are brought. Between the above red point and the base of mount Dilly the sea shore is low, sandy, and fringed with cocoa-nut trees ; 3 or 4 miles inland the country becomes hilly. There is backwater communication for boats from this river to Hoss Droog, nearly 30 miles to the north, passing to the eastward of mount Dilly.

Supplies.—Good water may be obtained from wells on the beach north-east of the fort ; fresh provisions and refreshments of various kinds, and excellent fruit may be procured ; there are Government Commissariat and Ordnance Departments at Cannanore, in fact it is a large military station.

LIGHT.—A *fixed* white light, elevated 110 feet and visible 12 miles

* *See* Chart :—Billiapatam River, No. 797; scale, m = 1·6 inches.

off, is shown from the flagstaff at Cannanore ; it is however extinguished during the S.W. monsoon, from May 20th to August 10th.

ANCHORAGE.—Vessels may anchor with the flagstaff N.N.E. about $1\frac{1}{4}$ miles off shore in 5 fathoms, mud. Ships' boats can easily land in the bay north-east of the fort ; the custom-house is on the sandy beach more than half a mile east of the fort. There are a few sunken rocks off Cannanore point, but not outside of 4 fathoms.

MOUNT DILLY, which may be considered the limit between the coasts of Malabar and Cánara, is a conspicuous headland, 850 feet high, and may be seen 25 miles in clear weather, but in the hazy weather of March and April scarcely 15 miles. The outer extreme of this headland is a little projecting cape joined by a low neck to the headland, and having an old fort 160 feet above the sea ; this bears from Cannanore flagstaff N.W. $\frac{1}{4}$ W. 14 miles.

Mount Dilly is (as it appears to be) really an island, though separated from the main low land by the very narrowest of creeks : on its eastern side is formed an extensive bay, but the water is not deep, though small coasters find there most convenient shelter, in 3 and 4 fathoms, against North-west winds, which greatly prevail off this cape from February till May, producing a drain of current to the southward, and a short confused swell.

The shore here is bold and safe for a vessel working up the coast to approach into 5 fathoms water.

CHAPTER IV.

CÁNARA AND GOA COASTS.—MOUNT DILLY TO TIRACOL RIVER.

Variation, 0° 19′ East in 1865.

The CÁNARA COAST extends over a distance of 190 miles; the southern half is low and sandy, and fronted with cocoa-nut trees, having rivers every 10 or 12 miles, and in a few places interrupted by little rocky points; the northern half consists of bold headlands, separating sandy bays, with rivers as above, and many islands and rocks lie off the shore.

MOUNT DILLY has been described in the previous chapter, so it may here suffice to say that, when viewed from the north-west, the highest peak appears on its outer part, and gives it the appearance of being very steep-to when seen from a distance and before the little fort point is visible.

The channel, between the Lakadivh islands and the West coast of India, is narrowest off Mount Dilly, from which cape the Elicalpéni bank, the easternmost danger of the Lakadivh group, and said to have less than 4 fathoms in one part, bears S.W. by W. 83 miles; the bank of soundings off the coast extends just halfway to the Elicalpéni bank.

KUVOY RIVER, which skirts round the north side of Dilly high land, is the actual boundary of the provinces of Malabar and Cánara; its mouth is 4 miles N.N.W. $\frac{1}{4}$ W. from Dilly fort point; it runs parallel with the coast for 15 miles northward, but is only available for small boats.

The COAST north of Kuvoy is a very straight sandy shore for 21 miles; at a distance of 5 miles from the sea there is table-land from 150 to 250 feet high. Nearly 20 miles N. by W. $\frac{3}{4}$ W. from Dilly cape is the old fort of Hoss Droog, on elevated ground, and close to it a traveller's bungalow, rather more than a mile from the shore, and about 150 feet above the sea; 2 or 3 miles at the back of this is a wooded hill, 550 feet above the sea, which early navigators called Mount Formosa; it is the outermost detached hill of a spur which stretches westward from the mountains of Coorg. Eastward of this hill are other conspicuous peaks, increasing in elevation as they near the Ghauts, which in Coorg are 4,000 or 5,000 feet high, but seldom are visible from the sea except in very clear weather.

The coast from Beykul to Mangalore is all sand, fringed with cocoa-nut trees, with the exception of the little rocky points above mentioned; the land at the back rises gradually from the sea, until at 5 miles' distance

there is table-land nearly 400 feet high, intersected by rivers every 6 or 7 miles. East of Beykul and Hoss Droog, a spur of the Ghauts, of considerable elevation, reaches toward the coast, but to the north of this the high land recedes and is not often visible.

From Mangalore to Cundapur the whole coast is sandy, with cocoa-nut trees, with the exception of Surutkul little rocky point, and the Cahp battery rocks: at the back of the trees the hills rise gradually towards the base of the mountains.

BÉYKUL FORT, covering the whole extent of a little prominent point, 130 feet high, bears from Dilly little cape N.N.W. 25 miles; there is a traveller's bungalow among trees to the north of the fort. Rather more than 1½ miles north-west of this fort is a reef of rocks, on which the sea breaks, having 4 fathoms close to it; this reef is rather more than half a mile to the south-west of another little rocky cape.

CAUSERGODE RIVER entrance lies between the two hill forts of Causergode and Chendaghiri, and bears from Beykul N.N.W. ½ W. 5½ miles; it is only available for very small coasters at high water. The course it takes inside is towards Chendaghiri, the southern fort, then bending northward it passes half a mile east of Causergode fort. There are a few rocks along the shore about 2 miles to southward of this river mouth.

CUMLA RIVER mouth is 7 miles N.N.W. of Causergode; this river has the same depth as the last mentioned in its entrance, viz. about 7 feet at high-water springs, and generally there are breakers right across; the entrance often changes.

MUNJESHWUR is a creek 8 miles to the northward of Cumla; between these places, and 6½ miles inland, stands Pussodi Gumpa, or Barn hill, 1,000 feet above the sea, a sloping mount, nearly level on the summit; which bears from Cumla N.E.; from Causergode, N. by E.; and from Mangalore, S.E.

MANGALORE, or Kodyal Bandar, is the chief town in the province of Cánara, and a place of large trade; the lighthouse is on high ground, 1½ miles E.N.E. of the river entrance, and 250 feet above the sea. The town is very large on the north and east sides of the river, which is navigable for boats for many miles up. The bar has only 6 feet on it at low spring tides, so that only small vessels can enter; Árab vessels of 150 tons manage to get in at high springs, but the larger bághalas, which bring horses from the Persian Gulf, are compelled to lie out in the roadstead.

The houses and trees on the elevated plateau by Mangalore lighthouse unmistakeably point it out; Barn hill, 16 miles south-east of it, is also a good mark. The Ass's Eafs, or Codinjau col, 17 miles N.E. of Mangalore, is a rugged double-peaked hill, of limestone, 1,100 feet above the sea, rising

almost vertically from the low country, but is in many views only just visible from seaward above the tops of intervening flat hills.

Mount Hyder, or Kudri Mukh (the horse's face), 30 miles N.E. by E. of Mangalore, is a magnificent peak, 6,000 feet above the sea, abruptly terminating on the south, when viewed from the westward. It is the south-west extreme of the Nuggur, or Bednore district, of the independent state of Mysore, and beyond it the Ghauts recede much to the eastward; the hills at the back of Mangalore are undulating, and separated from each other by valleys through which rivers run from the mountains.

LIGHT.—A *fixed* light on a white tower is exhibited on the hill at the back of the town, at an elevation of 250 feet, and may be seen in clear weather 14 miles, but in the hazy weather of March and April only 10 or 11 miles. On the lighthouse hill there are houses and trees, which form conspicuous marks in the day-time.

Tides.—It is high water, full and change, at 11 h.; ordinary springs rise 7 feet, neaps 3½ feet; night tides are higher than day tides in the fine season.

ANCHORAGE.—The most convenient anchorage for communicating with the river is with the lighthouse E.N.E. in 5 or 6 fathoms, muddy bottom; in case of a North-wester, (which breezes prevail here in the afternoon between February and May,) boats can conveniently come out of the Gurpur mouth, 2 miles north of the Mangalore entrance, at high water.

SOUNDINGS.—In approaching Mangalore from the northward, caution is necessary to avoid the St. Mary's Isles and Molky rocks, the latter being in the line of 9 fathoms, and it must be remembered that this is a projecting part of the coast. The bank on which a ship may get soundings extends nearly 40 miles off Mangalore; there being a depth of 10 fathoms at 4 miles off shore, 20 fathoms at 10 miles, and 30 fathoms at 18 miles, all muddy bottom, between Mangalore and Mount Dilly; but above the latitude of Mangalore these depths are found much further off shore. Abreast of Barkúr and Cundapore, 30 fathoms is found more than 30 miles from land, and soundings of between 20 and 30 fathoms occupy a flat, 17 miles broad East and West, between the latitudes of St. Mary's Isles and Pigeon Island. At depths greater than 30 fathoms on this part of the coast the bottom is generally sand or rock.

SURUTKUL is a little point with a temple on it, about 150 feet above the sea, bearing N. by W. 9 miles from Mangalore river mouth; the intermediate shore is straight, sandy, and planted with cocoa-nut trees.

MOLKY RIVER entrance is 4 miles northward of Surutkul, on the same bearing, and is nearly 10 miles south-east of the rocks above water, lying out in 9 fathoms, usually called Primeira, or Molky rocks.

The town of Molky has a church on high ground more than a mile N.N.E. of the river entrance. The river mouth dries nearly right across at low water springs, but has 6 or 7 feet on the bar at high water.

The MOLKY, or PRIMEIRA, ROCKS bear from Mangalore light-house N.N.W. ½ W. 22 miles; they are situated 4 miles from the main-land, are of black basalt, elevated in parts 40 feet above the sea, and may be seen 9 or 10 miles from a ship's deck. On their east side the bottom is sand and broken shells, which is not good holding ground, otherwise a vessel in extremity might anchor to leeward of them in a Westerly gale; the channel between them and the main is perfectly safe, but contracted to a breadth of two miles on the north by the Cahp rocks, which are above and below water, 3 miles to the north-east of the Primeira; and there is a detached rock out in 4 fathoms 3 miles due East of them, off the little hill of Uchil Guda, which hill is on the shore 20 miles N. by W. ½ W. from Mangalore lighthouse.

Cahp Battery, 2 miles N. by W. of Uchil, is an old rock fortification on the sandy shore, and from this the outermost Cahp rocks bear W. by N. 1½ miles.

There is an old temple, called Cunjár Guda, within a fort on an isolated hill, 280 feet high, a good landmark, 4 miles N.E. of Cahp battery.

Rocks awash.—At the distance of 4 miles N. by E. from the Molky rocks, is a patch of dangerous rocks awash; they lie out in 5 fathoms, with Cunjár Guda bearing East, and they are 1½ miles to the south-west of a solitary black rock standing out of the water, mid-way between Cahp rocks and the southernmost islet of the Déria Bahádur Ghur group.

DÉRIA BAHÁDUR GHUR, bearing N. by E. 8½ miles from Molky rocks, is the highest and middle one of the 3 islands generally called St. Mary's isles, and its highest part is 70 feet above the sea; these islands are basaltic, and in some parts have long grass and creepers. The northern, a separate island, which is nearly 3 miles N.N.W. of Déria Bahádur Ghur, has cocoa-nut trees on it, and water is obtainable by digging; there are rocks midway between these islands, and scattered about to the North of them; rocks awash extend 1 mile to westward of the cocoa-nut island, and another patch at the distance of 2 miles north-west of it; whilst to the northward there are other rocks until abreast of Barkúr river.

A ship should not approach this part under 8 fathoms, by day, in working up the coast, or 12 fathoms by night; in running down coast it is prudent not to come under 15 fathoms.

Anchorage.—To small coasting vessels excellent shelter is afforded from North-west winds between Déria Bahádur Ghur and the sandy shore abreast; the passage in is close round the south end of these 3 islands,

and the anchorage is sand and mud, in 3 fathoms at low water, with the highest part of Déria N.W. The sandy shore abreast is the south side of the Mulpy river, the entrance of which is 1½ miles from the above anchorage, but the nearest sandy point is only half a mile off.

Mulpy River (whose entrance, though shallow, is much protected by the Déria group of rocks), trends inland to the south-east; the land at the back gradually rises from the sea; Mulpy church, 3½ miles E. by S. of Déria, shows well in the afternoon. Above Mulpy river the sandy coast trends N. ½ W.

BARKÚR RIVER mouth is 8 miles north of Déria Bahádur Ghur, and above this there are no outlying rocks till you reach Cundapur, off which, at a distance of two miles west of the entrance, is a reef on which the sea breaks.

CUNDAPUR RIVER mouth, 18 miles north of Déria Bahádur Ghur, is now a place of considerable trade; the rocks off it, above mentioned, afford a little shelter to small coasters from north-westers, but these vessels generally run into the river at high water. At the distance of two miles N.N.W. of the entrance, is a little rocky point; and one mile further north-west is a sandy point, off both of which patches of rocks extend into 5 fathoms water.

The COAST.—From the Cundapur sandy point (just mentioned as 3 miles N.W. by N. of that river mouth) the sandy coast runs N. by W ¼ W. 12 miles to Byndur head, 5 miles south of which are some dangerous rocks awash, in 6 and 7 fathoms at low water, situated 3 miles from the shore. To the west and north-west of Byndur are other rocks in even deeper water, which render this part of the coast dangerous, and it is prudent to give them a wide berth.

The land near this part of the coast shows in detached pieces of table-land, most easily recognized as such in the morning, when the mist hangs in the valleys; scattered here and there are little round hills of about equal height.

The mountains of Bednore and Nuggur come very close to the sea about here, being only 6 miles off, and have some beautiful peaks more than 3,000 feet high; Yelgetty Guda, the southern one, 2,950 feet above the sea, is a beautiful sharp peak, 7 miles east of Byndur head, and very conspicuous to a vessel coming from the northward.

Barsilore peak is a round mountain, 3,600 feet above, and 9 miles from the sea; but, having the high chain of the Bednore mountains for its base, does not show much above them except at a distance from land.

Colúr Guda, or Codáchi Parwut, 4,400 feet above the level of the sea, is a magnificent sugar-loaf peak, 17 miles N.E. ½ N. of Cundapur;

it was styled by early navigators *false* Barsilore peak, from the fact of its being frequently mistaken for the peak of that name, which is 8 miles farther to the W.N.W., and only visible at a great distance from land; for other peaks, intervening between it and the sea, hide Barsilore peak, whereas Colúr Guda is distinct, being perfectly isolated, but it disappears behind the others when bearing to the southward of East.

Byndur River and town are on the east side of Byndur head, which is a piece of table-land jutting into the sea, and running back for some distance inland. The river is only fit for little boats, and the scattered rocks off it make it unsafe to approach.

Huddi Point is $5\frac{1}{2}$ miles N.W. by N. of Byndur head; the space between them is studded with dangerous rocks; one, a white rock, just above water, bears S.W. by S. $2\frac{1}{4}$ miles from Huddi point, and 2 miles south of this single rock are 2 white rocks close together above water; and between these and Byndur head and south of that headland there are numerous others, which, extending out to the depth of 7 fathoms water, make this coast unsafe to approach under 10 fathoms.

BATKUL DROOG is a little fort on a rocky point, $1\frac{1}{2}$ miles to the north-west of Huddi, at the entrance of a little river. The town is one mile up the river, and was formerly a place of considerable trade, known as Baticólo. The East India Company had a factory there, which was deserted in 1670, owing to the massacre of the English living there.

Some of the inhabitants of this place are descendants of the Arabs, and still retain many customs like to theirs.

None but coasters frequent this place now, but a vessel may anchor in 6 fathoms, mud, with Batkul fort N.E., the immediate vicinity of this anchorage being free from rocks, though many exist to north-west and south.

JÁLI KUND, or Hog Island, a peaked island, rising 300 feet out of the sea, bears from Batkul Droog N.W. $\frac{1}{2}$ W. 4 miles, and is $1\frac{1}{2}$ miles from the sandy mainland; there are rocks awash off it on the south-east and north-east, and 2 or 3 little islets one mile to the N.N.E.; on its west side it is perfectly safe to approach within a mile, or into 7 fathoms water.

From Hog island the single white rock (mentioned as lying more than 2 miles off Huddi point) bears S.E. by S. distant 6 miles.

NETRUN, or **PIGEON ISLAND**, is a large round island 300 feet high, flattened at the top, nearly half a mile in length east and west, and rather less the other way; off its south-west end is a little islet. Pigeon island bears W. $\frac{1}{2}$ N. 9 miles from Hog island, and may be seen 20 miles from a ship's deck in clear weather. It stands in the line of 18 fathoms, and is deep-to; but, on its south-east side, a ship can get 15 fathoms water half a mile off, and be slightly sheltered from a North-wester. A depth of 20

fathoms water is close to the west of it, 25 fathoms about 5 miles off, and the bank of 30 fathoms is from 13 to 22 miles off; the edge of the bank of soundings in 100 fathoms is upwards of 50 miles west of Pigeon island, and 60 miles from the coast.

Modeshwur is a little projecting rocky cape, 5 miles north of Hog island; off it, at the distance of one mile to the south-west, lies a little rocky islet, and at the same distance to the north-west of the cape is a ledge of rocks. In working up the coast a vessel may safely stand in to 7 fathoms here, though below Hog island that depth would be too close. At the distance of 3 miles N.E. by N. of Modeshwur is the western hill of a spur from the Coorg mountains, called Cota Guda, a saddle-back hill, 1,450 feet above the sea.

Munki Droog is a fort-like hill overlooking a little sandy bay, 6½ miles N. by W. ½ W. from Modeshwur, where small coasters find a little shelter from north-westers, when working up the coast. This cape is a piece of table-land about 250 feet above the sea, but its northern part rises to an elevation of 450 feet; this rocky cape is 2 miles long, and above it is a sandy shore to Honore river.

HONORE RIVER mouth bears from Hog island N. by W., and from Pigeon island N.N.E., being equi-distant from both nearly 17 miles. Vessels may anchor off Honore in 5 fathoms, muddy bottom, with the monument (which is half a mile to the rear of the houses amongst trees which stand on the brow of the hill overhanging the landing place) bearing E.N.E., and Fortified island N. ½ W.

Honore has a considerable coasting trade; but since the abolition of the East India Company's factories along this coast, this and other places, as Batkul, have become of little importance, all the trade now finding its way to Bombay.

BASWARAJAH DROOG, or Fortified island, has, as its name implies, some old fortifications on it, formerly erected by a rajah of Mysore, but now they are in ruins. This island, which is covered with brushwood, and standing half a mile from the shore, bears 3 miles N.W. by N. of Honore river entrance, and consists principally of ironstone; small coasters find shelter under its lee from North-westers.

CUMTA POINT.—This little point, bearing N. by W. 6½ miles from Fortified island, forms a little bay off the mouth of Cumta creek which it protects from N.W. winds; but the water is very shallow, and the coasting craft which are too large to enter the creek at high water, anchor in 3 or 3½ fathoms, sand and mud, to the southward of the point without any shelter. The commercial town of Cumta is on the north side of the creek, about one mile eastward of the lighthouse.

Cumta, though an open roadstead, is a place of large trade, owing to roads having been constructed from it to the famous cotton districts of the Dharwar country. About a mile north-west of Cumta rocky cape is a rock above water, called the Snail rock, from its resemblance when viewed from the anchorage off Tudri river.

LIGHT.—At 6½ miles N. ½ W. from Fortified island, the Cumta light-house, a white column, 65 feet high, stands on a hill more than 100 feet high, situated half a mile to the eastward of the rocky cliffs of Cumta point. It exhibits, at an elevation of 180 feet above the sea, a *fixed* white light, visible 12 miles in clear weather. This light overlooks the mouth of the creek which leads boats at high water up to the cotton merchants' warehouses on the south side of the town.

TUDRI or **MIRJAN RIVER** (Tudri being the town at its entrance, and Mirjan another about 5 miles higher up) is a fine river,* the bar of which bears N.N.W. 6 miles from Cumta lighthouse. It is situated in a deep bay formed on the south side of a high cape, the centre of which, called Kúdini-gúda, is 430 feet above the sea. This projecting land affords excellent shelter from North-west winds to vessels anchoring off the mouth of the river. On the east side of the entrance is the old hill fort of Rajahmun-droog, the upper walls of which are 300 feet above the sea ; and on the top of the hill, about a quarter of a mile to the north-east of the fort, there is a little beacon at an elevation of 400 feet above the sea.

Just within the entrance on the sandy point there is a large screw-house, erected by Mr. Brice, and abreast it is a wooden pier, where several cotton ships have been loaded since 1857. The town of Tudri lies along the river-bank north-west of the screw-house. The river is not navigable any distance up, except for small boats, which may go to Cutgál 12 miles above Tudri.

On the north-west extreme of Tudri high land, and close to the sandy shore, lies the famous town of Gokurn, (which means the cow's ear,) with many large temples, and tanks of fresh water ; this is a place of great repute among the Brahmins.

ANCHORAGE.—Large vessels may anchor off the bar in 5 fathoms, mud, with the beacon on Rajahmundroog hill E.N.E., and the outer cape of Tudri N.W. ; from this position the Cumta light will bear S.E. ¾ S., and the Tudri river entrance N.E. by E. Arrangements for getting into the river may be made with the local authorities.

TIDES.—It is high water at the bar of Tudri, full and change, at 10 h. ; ordinary springs rise 6½ feet, extraordinary springs with the night tide in the fine season rise nearly 8 feet ; neaps 4 feet. There is a depth of 10 feet

* *See* Chart, Merjee River, No. 795 ; scale, $m = 1{\cdot}5$ inches.

on the bar at ordinary low springs, and vessels drawing 15 feet could be taken in and out at spring tides.

GUNGAWÉLI river is 5 miles N.N.W. of Tudri south-west point; its entrance, which is shallow, and rendered tortuous by sand-banks, is on the sandy shore; but there is a rocky cape close to it, half a mile to the W.N.W., the cliffs of which extend along the shore for 2 miles to north-west, there terminating in a projecting cape, forming a little bay on its north side, in which however there is no shelter, as a reef of rocks lies in the middle of it.

From the forests, on the banks of Gungawéli river, splendid teak timber is floated down; this is the property of the British Government, and is carried in native vessels to the dockyard of Bombay.

The rocky cape north-west of Gungawéli mouth, called Cusuldéva Guda, is highest in the centre, being there 550 feet, and slopes gradually either way; about 15 miles due east of it is a high range of hills, which need not be described, as all the landmarks along this sea shore are so prominent and well defined.

UNKÓLA CREEK, distant 2½ miles N. by E. of the north-west cape of Cusuldéva, is quite dry in the entrance at low water; the town of Unkóla, which is nearly 2 miles inland, is a large place, having a ruinous fort, a bazár, and many temples.

BELIKÉRI BAY.—This is an extensive bay comprehending the whole space between Gungawéli rocky cape and Cawda Guda, a distance of nearly 7 miles. Belikéri point is a low flat rocky point 2 miles north of Unkóla creek; on it is a large bungalow amongst trees, and to the north of the rocky cape, which projects westward with rocks off it, is the little river of Belikéri. One mile west of this river entrance is Kukra, a woody island, which is almost connected with rocks to Belikéri point.

To the northward of Belikéri bay there is very high undulating land, about 1,700 feet above the sea; the low valley of the Belikéri river goes straight to the north-east for many miles, and shows in striking contrast to the high lands on either side of it.

Tulsi parwat, is a peaked hill, with a black cap, 1,680 feet high, 4 miles north-east of Unkóla.

At the distance of 3 miles W. by N. from Belikéri point, is a steep rocky cape, called Cawda Guda, projecting into the water to the south-east, and thus forming the extensive Belikéri bay, which is 2 miles deep, affording excellent shelter from North-west and even from Westerly winds, but to small vessels only, as the water is shallow. The bay to the east of Cawda Guda (not Cawda bay), is very convenient for grounding small vessels to clean their copper, the water being so smooth.

Cawda Guda Cape (the south point) is 6½ miles N.W. by N. of the north-west cape of Cusuldéva; and the Belikéri bay comprises the entire great bight eastward of these two points. There is a succession of rocky capes and sandy bays between Unkóla and Carwar head, with islands lying off them.

AURIGI CAPE, having a high rocky wooded island lying off it, is 3 miles W.N.W. of Cawda cape; the space between them is a sandy bay 2 miles long, and this is called Cawda bay; this sandy bay is broken into two at high water by a rocky cliff nearly midway along.

BUTTON ROCK is a little black islet in 7½ fathoms water, and 3½ miles west of Cawda Guda cape; there is a depth of 6 and 7 fathoms in the channel, which is nearly one mile wide, between it and Aurigi cape island.

ANJIDÉVA ISLAND, belonging to the Portuguese, is three-quarters of a mile long, south-east and north-west; its northern end is highest, and has cocoa-nut trees on the summit, being there more than 200 feet above the sea. The low south-east extreme of Anjidéva is 2¼ miles north-west of Button rock, and the passage between them is safe and deep. The island's western side is rocky and barren, but the east side has good houses and gardens, and a fort with a flagstaff. At the anchorage in 5 fathoms, mud and sand, to the east of this fort, vessels have ridden out the S.W. monsoon, as the island forms an excellent breakwater. At that season a strong current runs to the south-east. Rather more than half a mile east of Anjidéva is a little rocky round islet, called Seria ka manda, about 40 feet high, and the sandy bay abreast is called Binghi bay, the outer cape of which is one mile north-east of Anjidéva, and the channel between them is perfectly safe.

BINGHI BAY affords excellent shelter for small vessels against North-westers; water and fire-wood can be obtained; it is a great place of resort of the Arab bághalas, and kótias, trading between Mangalore and Calicut and the Persian Gulf.

CARWAR HEAD is 3 miles N.N.W. of Anjidéva, and 2½ miles N.W. of Binghi point, one little rocky cape and two sandy bays intervening. Rather more than half a mile to the south-west of Carwar head there is a round rocky island, called on the charts, Elephant island, between which and the head is a perfectly safe channel. The town of Carwar, or Carwad, or Cadavaud, where formerly was situated a large factory of the late East India Company, lies up a creek which runs into Sedashigar river, and is 3½ miles to the north-east of Beitkul cove. Carwar head, which should properly be called Beitkul head, by which name it is known to the natives,

is in its highest part 650 feet above the sea, a magnificent headland, and very steep-to, having 6 fathoms water close to the cliffs; it forms the southern boundary of Sedashigar bay, of which Loliem point, 6¾ miles to the N.N.W., is the northern limit. The bay of Carwar* between these points is thus nearly 7 miles long, and more than 2 miles deep, having a depth of 6 fathoms on the line between its extreme points, and gradually decreasing soundings towards the bottom of the bight.

PORT of CARWAR, known also as Beitkul cove, a small but safe haven, where the Indiamen used formerly to careen, lies to the east of Carwar head. At the mouth of this cove, and along the north cliff of Carwar head, vessels can lie in 4 fathoms at low water, facing the W.N.W. swell, and moored head and stern, at the distance of 2 cables' lengths from the shore, sufficiently sheltered from the S.W. monsoon to enable them to load or discharge cargo. A new town has been built on the north-east of the cove, to which the local government has given the name of Konay; they have also decided to call the port Carwar, by which name it was known to the early navigators of the Indian seas.

Godhully peak 1,800 feet above the sea, bearing E. by S. 4 miles from Carwar head, is the highest mountain by Sedashigar, being visible 40 miles off in clear weather; one mile east of it there is another of rather less elevation.

Sedashigar Town, which is a small military station, being on the frontier, lies on the north bank of the river, on the north-east side of the old hill fort, called Sedashivaguddu, just inside the river entrance, and 3 miles N.N.E. of Beitkul cove. This fort was founded by Sedashwa Ráo, one of the rajahs of Soonda, in the year 1564. There are two or three bungalows on the old hill fort, the south end of which is a steep bluff, elevated 200 feet above high water mark.

The Káli Nadi, or Sedashigar river, lies behind the islands in the middle of the bay; its entrance when surveyed in 1855 was 3½ miles north of Carwar head, or to the north of the two islands, Curmaghur and Sunghiri; but since 1857 the river has burst out to the east of these islands, and only 2½ miles north of Beitkul cove, at the very spot where its mouth was 50 years ago; it is probable, therefore, that it will again work up northward.

When the entrance was to the north it had a depth of 20 feet on the bar at high water springs, but since the mouth has moved southward (the northern one still remaining open, and serving to discharge some of the river water), there has been found a much less depth, about 15 feet only, at high water springs.

* *See* Chart :—Sedashigar Bay, No. 242; scale, $m = 2{\cdot}0$ inches.

On account of this frequent alteration of the river mouth, no special directions for entering can be given, but large ships may occasionally be able to enter, if assisted by a steam tug.

Sunghíri Island, called also Deoghur, or Buffalo, 120 feet high, is nearly 2 miles north of Carwar head; the fishermen grow a little hemp on its top, but it is difficult of access, being very steep.

Curmaghur Island, 3 cables' lengths to the north-east of Sunghíri, is elevated 180 feet in its centre. This island has been fortified all round, and much of the work remains in good condition to this day; on the eastern side, within the fort, is a well of fresh water amongst some trees. To the east of this island the water is quite shoal, the sand being deposited in the still water to leeward of it. Between Curmaghur and Sunghíri is a safe passage, but a vessel should borrow on the former, as there are rocky patches off the east end of the latter.

The OYSTER ROCKS, the most seaward landmark of Sedashigar bay, are a cluster of islands, covering the space of a mile in length east and west; the north-west one, the highest, is 160 feet above the sea, and has a depth of 7 fathoms water two cables' lengths off it. A lighthouse is now being erected on this in latitude 14° 49′ North, and longitude 74° 3′ East, and vessels may then anchor to the E.N.E. of these rocky islands, during the S.W. monsoon, in smooth water. This highest Oyster rock is 2 miles W.N.W. of Carwar head, and the fair channel between them is more than one mile broad.

LIGHT.—A temporary light has been placed on the Oyster rocks. It is a *fixed* white light, at an elevation of 160 feet above the mean level of the sea, and in clear weather should be seen 10 miles. The tower is round, of white granite, 40 feet high, standing on the summit of the largest, or North-west Oyster rock.

The apparatus is to be replaced by a dioptric one of the first order, when the light will be visible 20 miles.

SHOALS.—A sunken rock, with 14 feet on it at low water, lies between the Oyster rocks and Elephant islet, with the lighthouse bearing N.W. ½ N. distant rather over 1½ miles; Elephant islet E.S.E., 6¼ cables; and the western ends of Deoghur and Curmaghur islands nearly in line, about N.N.E. A *red* buoy marks its north-west side.

A shoal, about 50 yards in length north and south, and 20 yards east and west, with 2½ fathoms on it at low water, over rocky bottom and shells, lies with the lighthouse bearing S.E. ½ E., distant 2½ miles; Curmaghur island E. ½ S.; and Black rock N.N.E. ½ E. There are 10 fathoms all round this shoal. A *red* buoy marks the west side of it; vessels should not approach within a cable's length. This is most

104823

probably the sunken rock described in Horsburgh's Directory, as lying 3 or 4 miles N.W. of the largest Oyster rock.

Nearly 2 cables' lengths to the eastward of the Oyster rocks there is a little rock, which is nearly awash at low spring tides; at high water the sea does not break on it during the fine season, therefore care must be taken to give it a wide berth, in doing which, the summit of Mádhully hill must not be seen to the *left* of the summit of Curmaghur.

Kumbay, or Black rock, is an islet standing in 4 or 5 fathoms water at the distance of 4 miles north of the Oyster rocks; the space between them is safe, (excepting the outlying shoal with $2\frac{1}{2}$ fathoms, distant $2\frac{1}{2}$ miles N.W. $\frac{1}{2}$ W. from the lighthouse), but at $1\frac{1}{2}$ miles W.N.W. of Black rock, there is the following danger:—

Sunken Rock, a little table rock, scarcely a boat's length across, frequently breaking, and nearly awash at low water springs, lies in $5\frac{1}{2}$ fathoms water, nearly a mile south of Loliem point, and 5 miles to the N. by W. of the Oyster rocks. When close to this rock, Godhully peak is in line with the left extreme or north-east side of Curmaghur island; therefore a vessel should give the rock a wide berth by keeping that peak to the right of that island.

Loliem Point, the north extreme of Sedashigar bay, and belonging to the Portuguese, is a steep rocky cape, well wooded, more than 300 feet high, and increasing in height to the eastward. In a little sandy bay, at $2\frac{1}{2}$ miles east of the point, there is the village of Polem (Polay), which is the border town of the Portuguese, and has a custom house with a military guard. The boundary line between Portuguese and British territory, passes eastward from Polem through the summit of a round hill called Bomgúda, between 6 and 7 miles east of Loliem point. The sunken rock, above described as nearly a mile S. by W. of Loliem point, bears from the highest Oyster rock N. by W., and is distant 5 miles.

TIDES.—It is high water in Sedashigar bay, full and change, about 10 h. Ordinary springs rise $6\frac{1}{2}$ feet; extraordinary springs with the night tide in the fine season rise 8 feet: neaps $3\frac{1}{2}$ to 4 feet.

ANCHORAGE.—Vessels may anchor on the south side of the Oyster rocks during North-westers, in 7 fathoms, mud, at the distance of 3 or 4 cables' lengths from the rocks, with the western islet W. $\frac{1}{2}$ N., and Curmaghur open to the right of all the Oyster rocks. Sailing vessels making the port at night should anchor in about 8 fathoms water, near the Oyster rocks light, and wait for daylight.

The inner anchorage of Beitkul cove is marked by a white buoy, 3 or 4 cables from the shore. Steer for this in a line with the Collector's bungalow on Konay hill, about E.S.E., and anchor in 4 or 5 fathoms water, mud bottom, to the north-west of Marriott's rock, which is also marked by a little buoy.

By night, a *red* light is exhibited at the Port Officer's house on Konay hill, which may be seen from near the Oyster rocks, and steered for about E.S.E., till in 5 fathoms ; then anchor.

DIRECTIONS for making the port of Beitkul or Carwar in Sedashigar bay. In the S.W. monsoon, sailing vessels, whether from Europe, China, or the Bay of Bengal, bound to Sedashigar, must pass to the westward of the Maldivh and Lakadivh islands (as directed in the chapter on passages to and from Europe and India). When in the latitude of Mount Dilly, they may edge away to the N.N.E., and endeavour to make Cape Ramas, a fine bluff high cape, 17 miles north-west of Sedashigar, having deep water and no dangers off it ; 10 fathoms water with muddy bottom will be found $1\frac{1}{2}$ miles off it ; 20 fathoms, mud, at 9 miles ; 30 fathoms, mud, at 16 miles ; and the edge of the bank of soundings at 45 miles. It is recommended to make the land so much to the north of the port, on account of the strong current, which at this season of the year sets to the southward along this coast. It will also be prudent so to regulate a vessel's speed that she may sight the coast in the daytime, when no difficulty will be experienced in making out the headlands and islands. When a proper system of lights is established, there will be no difficulty in approaching the port.

Cape Ramas, is a prominent point of table-land 200 feet above the sea, and therefore never visible more than 15 miles ; but it projects one mile west of a high bluff, called False cape Ramas, which may be distinguished in clear weather, by a vessel approaching from the southward, at a distance of 25 miles.

Although this false bluff of Ramas is visible more than 25 miles in clear weather, yet in the thick weather of the S.W. monsoon perhaps not one-third of that distance, and during the heavy rain squalls probably no part of this coast can be seen more than 4 or 5 miles.

Between Cape Ramas and Sedashigar bay the coast is undulating, forming several small bays ; the soundings are regular into 5 fathoms, but the sunken rock standing out in $5\frac{1}{2}$ fathoms off Loliem point must be remembered, as well as the recently discovered shoal lying $2\frac{1}{2}$ miles to the north-west of the lighthouse on the Oyster rocks.

In running in for Beitkul cove, during the S.W. monsoon, it will be better to pass round the west and south sides of the Oyster rocks, as in passing to the north-east of them, under shortened sail, a vessel would drop so much to leeward in the heavy south-west swell. It is believed, however, that before this port is entered in the S.W. monsoon, proper lights, beacons, and pilots will be available. During that season the strong current setting down the coast, running at right angles to the swell and wind, is pressed into Sedashigar bay, and runs out along the north side of Carwar head.

During the N.E. monsoon the port can be approached from any quarter, and with a chart of the bay a vessel can work, or run in, according to the wind.

When running into Port Carwar from the southward, the summit of Mádhully hill must be *hidden* behind the summit of Curmaghur.

Soundings.—Anjedéva and the Oyster rocks are steep-to on their sea face, and 10 fathoms water is found about 1½ miles from them, and 20 fathoms at 9 or 10 miles. 30 fathoms water is found off this part of the coast at the distance of 18 miles, which is much nearer than such a depth is found off Honore and Mangalore, between which places the bank having that depth extends more than 30 miles off shore.

The GOA COAST, belonging to the Portuguese, is about 55 miles in length, consisting of sandy bays, fronted with cocoa-nut trees, and separated by several lofty and extensive rocky capes.

The coast north of Loliem point trends due North for 4 miles to the Talpon river, and three capes with three sandy bays intervene; in the middle bay is another small river. Above Talpon is the town of Cánacon, the capital of the district of that name, and a military station. Off the sandy bay of Cánacon, and south of a little rocky island, is good shelter against North-westers for small vessels, in 3 or 4 fathoms, mud.

Paidegal Point is a steep projecting rocky headland 3½ miles north-west of Talpon river. Paidegal village is on the north side of the headland, above which the coast is sandy for 1½ miles, then rocky to Cape Ramas.

CAB DE RÁMA, or Cape Ramas, is 6 miles N.W. ½ W. from Paidegal point, and 18 miles N.N.W. ½ W. from the outer Oyster rock. It is a very prominent piece of table-land, 200 feet high, and nearly a mile in extent, seemingly cut into two, as viewed from a distance southward of it, this gap being the ditch which environs the west side of the fort, the flag-staff of which (from which the Portuguese generally show their colours to passing ships) is nearly half a mile within the extreme cape. The landing place of Cab de Ráma is a very small sandy bay on the north side of the fort, and not quite a mile E.N.E. of the cape. Two springs, one of warm, the other of cold water, gush out side by side near the beach a little to the north of the landing place, which is in a bay formed between Cape Ramas and Moliem point, another prominent and very similar point, close off which is a little rocky islet 1½ miles N. by E. ½ E. of Cape Ramas.

Small vessels take shelter from North-westers, in 5 or 6 fathoms, close under the south side of Cab de Ráma fort, where the shore is remarkably steep-to.

FALSE CAPE Ramas, which is first seen from a ship, is one mile east of the true cape. This false bluff is elevated about 700 feet, and abruptly drops down on the west upon the table-land of the true cape. From this

abrupt drop the land rises gradually to the eastward, in a succession of four or five hills, for the distance of 4 miles, where this piece of high land terminates in a mountain nearly 1,500 feet above the sea; then comes a gap through which is the main road between Cánara and Goa, and beyond this are the mountains of Cánacon, 2,000 feet high.

The COAST north of Cape Ramas forms a bight to Moliem point, 1½ miles, and to the north-east of that point is another bight, with three little sandy bays; then a flat rocky point, on the north side of which is the mouth of the Salset, or Margao river, a considerable stream, but only available for small coasting vessels. The town of Bétul, at the entrance of Margao river, is 3 miles north-east of Moliem point, and more than 4 miles N.E. by N. of Cape Ramas.

Chandernát, a white pagoda, on a pretty hill 900 feet above the sea, is situated about 6½ miles to the north-east of Margao river mouth.

Above Salset river mouth the coast is perfectly straight and sandy, in a direction N. by W. ½ W. for nearly 15 miles, and is safe to approach into 5 fathoms water, which depth is one mile off shore.

Col or Colla is a town in a little bay at the north extreme of the above long sandy shore, and 18½ miles N. by W. of Cape Ramas; Col bay affords excellent shelter from North-west winds, having deep and very smooth water. Westward of Col bay there are several rocky capes, and sandy bays, for 5 or 6 miles, to Marmagao point.

ST. GEORGE'S ISLANDS are indeed one island, nearly severed into two; a very narrow neck of sand and shingle being the only connection. The western portion, or what is usually called the outer island, is a high cone, 250 feet above the sea; and the eastern part is wedge-shaped, its highest elevation being at its east extreme, where it is 200 feet above the sea. In length east and west they extend more than a mile, but are quite narrow in a north and south direction. To the south-east of them vessels will find excellent shelter from North-west winds, in 10 or 11 fathoms, mud, but not too near to the islands, for off them lie several rocks, level with the water's edge; and half a mile east of the islands is a patch of rocks, dry at low water.

The Sail rock, half a mile south of the western or conical island, is about 40 feet out of water, and may be easily from a little distance mistaken for a vessel. East of the Sail rock, and between it and the islands, there are rocky patches.

The western St. George's island bears N.N.W. ½ W. 18½ miles from Cape Ramas, and 6½ miles W. by S. of Col bay.

Soundings.—Extending to some distance on the north of these islands there is a flat, the bottom of which is sand and rocky, with overfalls from

7 to 4 fathoms, and less in one or two places, so that the channel between them and Secretario island, (formerly called the eastern St. George's island, but it belongs to the Portuguese,) though 1½ miles in width, is not recommended, although close to Secretario island there is a good depth of water.

St. George's islands are in the line of 10 fathoms water, and have 12 fathoms close to the south of them. There is 20 fathoms at the distance of 6 or 7 miles to the westward, and 30 fathoms at 15 to 17 miles, the bottom being mud ; but outside of 30 fathoms it is generally sand or rock.

MARMAGAO POINT is to the north of Secretario island, and its north-west extreme is 4 miles N. by E. ½ E. from the western St. George's island. On the north-east side of Marmagao promontory (which is nearly 2 miles long, north-west and south-east, and connected by a sandy neck to the other high land), small frigates used formerly, during all the S.W. monsoon, in years gone by, to lie moored head and stern, in 3½ fathoms, at low water, two cables' lengths off shore. In 1857 troops were landed there by a steamer during that stormy season.

The Buffalo Rock or Camberi, part of which stands up above water, lies nearly one mile to the south-west of Marmagao point, and has 5 and 6 fathoms round it. To the north of it, and four cables' lengths off, is a three-fathom rocky patch, which a vessel running into Marmagao must remember.

Marmagao Roads.—The north side of Marmagao point is bluff and steep-to, having 5 fathoms close to the shore, and a vessel must borrow on this, when running in, as the Ami shoal on the north narrows the passage to three-quarters of a mile.*

To sail into Marmagao roads, in coming from the northward, give a good berth to Cáb6 reef (the foul ground of which fronts the monastery cape, at the distance of three-quarters of a mile), keeping St. George's islands open to seaward of Buffalo rock, until St. Ignácio island, up Marmagao river, half disappears, or is half shut in behind Chikli point, which is 3 miles east of Marmagao ; this is to avoid the Sunchi and Ami reefs, but when the last named marks are on, a vessel may stand in for the roads, and anchor in 4 fathoms, at low water, with the east extreme of the Marmagao fort bearing S.E. ½ S., and the flagstaff on the hill S.W. by W., between 2 and 3 cables' lengths from the fort walls.

If a ship be disabled and obliged to run for Marmagao roads in the S.W. monsoon, when thick weather prevents the marks from being seen, it must be remembered that Marmagao point is nearly 4 miles N. by E. ½ E. from the outer St. George's island, and that, besides the Buffalo rock, there is the three-fathoms patch to the north of it ; therefore do not

* *See* Chart :—Goa and Marmagao, No. 793 ; scale, $m = 0{\cdot}8$ of an inch.

approach Marmagao point till it bears East, when you may steer for it, and round it as close as possible, till you reach the anchorage, being prepared to anchor in the event of the wind entirely dropping, as is very likely under the lee of the headland. Supplies of various kinds may be got from Goa, being brought round by an inland navigation.

GOA BAY and HARBOUR.—This place, the capital and principal seaport of the Portuguese possessions in the East Indies, has not such deep water as formerly in the bay, though the depth on the bar of the river is the same as represented on the charts executed half a century ago. Shelter for small vessels, from N.W. winds, is to be had to the south-east of the lighthouse and landing pier, in about 4 fathoms at low water, about 3 cables' lengths from the rocky shore. Inside of 5 fathoms the bottom is mixed sand and mud, but outside of that depth there is mud. Sáokari creek, round the east end of Agoáda table-land, is an excellent little refuge for small coasters.

Nossa Senhora da Cábo (formerly a monastery, but now the residence of the Governor-General of Goa) is a white building on a cape between Marmagao and Agoáda, and generally spoken of as Cábo. A bay is formed between it and Gaspar Dias, a fort on the sandy shore 1½ miles to the north-east of Cábo.

Cábo Reef, which the tide covers and uncovers, extends half a mile off, but foul ground nearly one mile off the cape; and at the distance of 1½ miles south of this are the Sunchi shoals.

Agoáda Point, 4½ miles N. by W. of Marmagao, and more than 8 miles north of St. George's islands, is a level headland, above 200 feet in height, fortified around the base, and on the top where there is a lighthouse.

Réis Mágos fort is on the south-east extremity of a large piece of tableland, three-quarters of a mile north of Gaspar Dias fort, and 2 miles E. by N. of Agoáda lighthouse.

Panjim or **New Goa,** the present capital of the Portuguese dominions, is 1½ miles north-east of Gaspar Dias fort, on the left or south bank of the river; it has one mile of river frontage, and contains many excellent buildings, palace, barracks, hospital, and market. The banyan tree, the pilot's mark, is above the church on the north end of the hills at the back of Panjim, and has a semaphore near it. The population of Panjim is about 10,000 souls; that of Goa territory being returned as 313,262; of this number, two-thirds are stated to be Roman Catholics. Panjim is now the seat of Government.

Supplies.—Ships always water at Agoáda after going out of the river, but at Panjim all kinds of fresh provisions and poultry may be obtained.

Rice, pepper, cocoa-nuts, betel-nuts, and salt, are the chief products; a good deal of cotton is now brought down the mountain passes into Goa, from the Belgaum district.

Goa City, situated on the south bank of the river, about 5 miles above Panjim, is now nothing but a heap of ruins, with a dozen churches, more or less in ruins, standing out from among the trees and on the hills; the place is very unhealthy. Midway between it and Panjim is the pretty little town of Ribanda, separated from Panjim by a salt marsh, over which is an excellent causeway.

LIGHT.—The lighthouse is a white round tower on the upper fort, exhibiting a light, *revolving* once in seven minutes, at an elevation of 280 feet above the sea; but not having powerful reflectors this light cannot be seen often beyond 12 miles, and less in hazy weather.

Near the lighthouse are a flagstaff and semaphore, and on the beach east of them is an excellent stone landing place, close by which is a well of good fresh water, from which shipping are supplied on application to the port authorities.

ANCHORAGE.—The common anchorage for large ships is abreast the fort, in 5 fathoms, mud, with the lighthouse bearing North, about three-quarters of a mile from shore; but small vessels may go in much nearer, to 3½ fathoms, mud, with lighthouse N.W., and the eastern cocoa-nut point of Agoáda N.E. by E. The bay is doubtless a little shallower than it was 50 years ago. Some rocks, mostly above water, project a small distance seaward from Agoáda south-west point, but this side of the bay is safer to borrow on than Cábo.*

After the early part of May, it was considered unsafe to remain at the Agoáda anchorage, it was usual then for the Portuguese to send their large ships, that could not go into the river of Goa, down to Marmagao, where they found shelter by mooring close under the fort walls of that peninsula; but even there, in the height of the S.W. monsoon, a swell rolls in round the point, rendering it necessary to moor the vessel, head and stern, so as always to have her bow to the swell.

TIDES.—It is high water throughout the bay of Goa, at full and change, at 10 h. 30 m.; the rise and fall at ordinary springs is 7 feet; extraordinary springs rise 8 feet; and ordinary neaps 4 feet. There is very little stream of tides in the roads, though in the river entrance it is strong.

DIRECTIONS.—The bar at the Goa river entrance, 1½ miles E.S.E. of the lighthouse, and near a white fort on the sandy beach called Gaspar Dias, has 13 feet at low water in the fine season; but in the S.W. mon-

* *See* Chart of Goa and Marmagao Roads by Inverarity. (1812.) Number (?); scale, $m = 4$ inches; also, Chart, Goa Harbour, No. 793; scale, $m = 0{\cdot}8$.

soon heavy breakers extend right across the bay, and the river mouth is sealed up.

There are said to be patches of rock on the sides of the entrance, and no vessel ought to enter without a pilot; indeed the regulations of the port insist on every vessel's taking a Government pilot, who will board the vessel from Agoáda.

There are good marks for entering Goa river, and the same have existed for 50 years, shewing thereby that the channel remains the same.

To enter the river, steer East towards Gaspar Dias; and after St. George's islands have disappeared behind Cábo, bring the banyan tree on Panjim hill on with Pilot's brow, the red brow of a hill half a mile nearer than Panjim, and steer for them about E.N.E. When the pilot's double headed tree, seen to the northward above the cocoa-nut trees, comes out from behind the eastern cocoa-nut point of Agoáda land, bearing N.W. by N., a vessel is close to the bar. Stand on about E.N.E. or E. by N., according to tide, keeping the Panjim banyan tree partly hidden behind Pilot's brow, which mark leads you right in till abreast of Gaspar Dias fort. Should you open out the whole of the banyan tree, the vessel may get upon the north sands; and if it entirely disappears behind the red brow of the hill, she may get on the south sands. The vessel, having thus brought Gaspar Dias to bear S.S.E., may then stand on E.N.E. and anchor in *"the well,"* which has a depth of 4 fathoms at low water, and is 3 cables' lengths to the N.N.E. of Gaspar Dias fort; or, if the wind will admit, she may haul up to the North for Réis fort, passing to the west of the fishing stakes; she must keep close to the Réis shore, after passing the fort, till past the Réis sand, which lies in the middle of the river; then, paying attention to the tide, she may gradually keep away eastward towards Panjim, off which the shipping lie in 4 fathoms at low water.

The COAST of Goa is so well defined by the outlying islands, and many white churches on the hills, as to require no further description than is above given; Bori mountain, 16 miles due East of St. George's islands, is a round mount, distinct from any others, and about 1,500 feet high, having some trees looking like a black wall on the summit. To the north of Agoáda promontory the coast is sandy for 4 miles, then come two rocky capes, with a sandy bay between them; then another sandy bay, beyond which is Chápra fort and river.

The coast to the northward of Chápra is sandy for 5 miles, but interrupted about midway by two little rocky capes, between which and Tiracól are some rocky patches, half a mile off shore; north of this sand is a rocky cape, and then three quarters of a mile of sand, which forms the south bank of Tiracól, or Pirnim river.

Chápra Fort is on the south side of the entrance to the river of that name, which is a considerable stream, running many miles inland, but the mouth having a bar can be only entered by small coasters. The fort is on a high bluff point, 8 miles N.N.W. of Agoáda point, and its black walls are easily discerned; the land adjacent to the sea on the south side is hilly, but the north side of this river mouth is sandy, with cocoa-nut trees.

TIRACÓL FORT, standing on the brow of a hill, on the north side of the river entrance, is the northern limit of the Goa territory, and 6 miles northward of Chápra; the little area of the fort and one mile round it being all that belongs to the Portuguese on the north side of this river, which has 8 or 9 feet at low water in its narrow entrance; there are rocks to the westward of the river mouth, but a vessel may anchor with the fort bearing N.E., in 5 fathoms, mud, one mile off shore.

CHAPTER V.

SOUTH KONKAN, AND PART OF NORTH KONKAN.—TIRACOL RIVER TO BOMBAY.

Variation, 0° 17′ East in 1865.

The coast, northward of Tiracol river to Damáon, a distance of 300 miles, is called Konkan, and is British territory, with the exception of the 30 miles between Bankot and Choul belonging to Hubshi of Rajpúri, which little independent State separates the North from the South Konkan.

The general features, of both north and south districts, consist of small sandy bays, and bold rocky capes. South Konkan has much table-land along the sea-board.

The GHAUTS, which are the eastern boundary of the Konkan, are not so high as those of Cánara, ranging only from 3,000 to 3,500 feet above the sea, and have no remarkable peaks. They stand like a wall, parallel to the coast, from which they are distant on an average 30 miles. That part of them called Mahableshwur, 35 miles east of Bankot, attains an elevation of 4,500 feet. The Mahableshwur hills are the southern limit of the North Konkan Ghauts, and the source of the Kistna river, which flows into the bay of Bengal.

This brief general description of the Ghauts is here given, as they are not otherwise much alluded to in the following description of the Konkan coast.

RÉRI POINT, bearing N.W. by W., 2½ miles from Tiracól fort, is a low flat rocky cape, the outer extreme of which is highest, being there 50 feet above the sea. Several rocks lie off it; but the outer rock, which is 36 feet high, and to the south-west of the point, is the outermost danger.

Réri Rock, standing 36 feet out of the water, and bearing W. by N. nearly 2½ miles from Tiracól fort, is the outermost rock off Réri point, from which it is not quite one mile distant, bearing S.S.W. This rock is steep-to, and lies in the line of 6 fathoms soundings. At night ships should not shoal under 10 fathoms.

Réri Fort, situated on an eminence about 100 feet high, and one mile north-east of the point, is conspicuous from seaward. Three miles east of the fort is Nánasi round hill, 390 feet high, thinly wooded. At the north

side of the fort is a creek, only available for small boats, and sunken rocks lie off its entrance.

VINGORLA BEACON, bearing N. by W. ½ W., 7 miles from Réri point, is a white pyramid on the south brow of a hill, overlooking the point and creek, at an elevation of 250 feet above the sea. Vingorla, or Engurla town, is one mile east of the mouth of the creek, and the camp is one mile further inland.

Vingorla is now a place of considerable traffic, being the seaport of the Belgaum district, to which it is connected by good roads. Troops to and from the Southern Mahratta country are embarked and landed at this port. Fresh water is obtainable at a spring just within the entrance of the creek. Vingorla now contains about 5,000 inhabitants; it has a tolerably good bazár, and an increasing number of merchants. It was formerly one of the retreats of the numerous sanguinary pirates who infested this coast, until, in 1812, it was ceded by the chief of Sawunt Wári to the East India Company.

In the little bay formed by Vingorla point small native vessels find shelter from North-west winds, and at high water are enabled to discharge cargo under a crane on a stone wharf. There are several patches of rock about this anchorage, and in the roadstead; half a mile due South of the beacon, lies one patch having 3½ fathoms water over it, and 2½ cables' lengths E.N.E. of this is another rock having 3 fathoms on it. During the periodical fresh southerly breezes which occur, for 2 or 3 days at a time, in the fine season, the little traders, that cannot get into Vingorla creek, make a fair wind of it, and run up to Malwan or Melundi harbour for shelter.

From Vingorla creek to the southward is a sandy shore for 2 miles to Machlimár, or Porpoise point, about 200 feet above the sea, from which the table hills extend in a crescent right round the east side of Vingorla camp, and join the beacon hill. A conspicuous wooded hill, 1,000 feet high, called Wagh ghiri, or the Tiger hill, stands E.N.E. 5 miles from Vingorla. Halfway between Vingorla and Réri point the sandy coast is interrupted by Machlimar point and creek, the shore is safe to approach into 5 fathoms mud.

Anchorage.—Large vessels must (as a general rule) anchor in 5½ fathoms, mud, rather less than a mile from the beacon bearing N.N.E.; but trooping steamers may, in fine weather, take up a berth in 4 fathoms at low water, between 2 and 3 cables' lengths S. by E. of the house on the point, avoiding the above-mentioned rocks, but at night they should move further out.

Tides.—It is high water, full and change, at Vingorla at 11 h.; springs rise 8 feet, neaps 5 feet.

VINGORLA ROCKS, or Burnt Islands, a group of islets and sunken rocks, extending 3 miles in a north and south direction, and more than a mile east and west, are situated some distance to the south-west of Nuti point, and 9 miles W.N.W. of Vingorla. The highest is a conical island, 180 feet above the sea; but the southern one is the largest, though of rather less elevation, and from this the northern one bears North distant 3 miles. The south-western islets, bearing W. by N. a little northerly from Vingorla beacon, 9¼ to 9½ miles, are four separate black rocks, about 50 feet above the water; there is a little sunken rock a cable's length to the south, but none to the west of them. They are deep-to, 12 fathoms being close, and 15 fathoms one mile off.

At Night, a ship passing the Vingorla rocks should not come under 17 fathoms. These rocks afford good protection from North-west winds, during which ships may anchor anywhere to leeward of them, in from 12 to 11 fathoms, mud, at low water, remembering that the rise of tide at springs is 1½ fathoms nearly, and at neaps 1 fathom nearly. There is plenty of water in the passage between them and Núti point; but, as there is a sunken rock on either side of the channel, sailing ships had better avoid it.

The Northern Vingorla rock, called **Karil,** bearing W. ½ S. 3 miles from Núti point, is a peaked islet, 70 feet high, and safe to approach on its north side within half a mile, where there is a depth of 9 fathoms; but nearly half a mile East of it there is a rock awash, which is the western danger in Karil ka chál channel, between Núti point and the islands.

NÚTI POINT bears N.W. ½ W. 8 miles from Vingorla beacon, and the intervening coast forms a deep bight, with several rocky capes and sandy bays, perfectly safe to approach into 6 fathoms water. Núti fort overlooks the point, at an elevation of 150 feet, and at the back of this is high land 500 feet above the sea. Half a mile south-west of the point is a sunken rock, called Bábra, the only danger on the Núti side of the channel.

Karil ka Chál passage, between the Northern Vingorla rock on the seaward side, and Karli foul ground and Núti point on the mainland, is three-quarters of a mile broad, having a depth of 9 fathoms, but a stranger should not attempt it. The leading mark to enter, in coming from the northward, is all Tiger hill open to the south of Núti point, bearing about E. by S.: and when all the Burnt islands and rocks bear to the westward of South, the vessel should haul gradually to the south-east to avoid Bábra rock, and then steer direct for Vingorla beacon.

Karli River mouth, on the sandy shore 2 miles N.N.W. of Núti point, is only available for small boats; off it are several islets, and a great extent of foul ground, extending 2½ miles from the coast, which should not be approached under 10 fathoms water.

SQUARE ROCK, about 40 feet high, the western visible danger of the Karli group of islets and rocks, bears N.W. ½ W. 4¼ miles from Núti point, and is 3¼ miles to the N. ½ W. of Karil, the northern Vingorla rock. The south extreme of Karli foul ground, in 4 fathoms over rocky bottom, bears S.S.E. from Square rock, about 2½ miles.

MELUNDI FORT, or Sindudroog, bearing North 3 miles from Square rock, is a strong level fort on an island, between which and Malwan is a snug harbour for small native vessels, the former refuge of the cruel Malwan pirates, who issuing from this place were the dread of defenceless trading vessels. To the south-west of Melundi for 2 miles the bottom is foul with overfalls.*

Between Malwan and the south extreme of the Vingorla rocks, excepting in the channel called Karil ka chál, the nature of the bottom is sand and rock, with sudden overfalls in the soundings. A vessel should be careful not to shoal under 10 fathoms off the foul ground of Melundi and Karli.

MALWAN POINT is a slightly elevated rocky cape, covered with cocoa-nut trees, close to the north of Melundi: its north-west point (round which is a little bay and creek) is 10 miles north of the southern Vingorla rocks, and 4 miles from the Square rock. Ships may anchor off Malwan in 8 fathoms, mud, with Koora rocky islet bearing North, and the north end of Melundi East, taking care, if coming from the southward, not to steer in for Melundi till it is on that bearing, on account of the rocky overfalls in the soundings mentioned above.

Koora Islet, a black low rock, bearing from Malwan point N.N.W. 2½ miles, has sunken rocks round it. Sirjakot river, lying 1½ miles to the south-east of Koora, is only available for fishing boats, and there are rocks off it. At the back of Malwan and Sirjakot is a range of hills, from 400 to 600 feet high; the northern peak is 5 miles N.E. of Koora, and is well defined.

Á'CHIRA RIVER, bearing N. by W. 6 miles from Koora, is only accessible to small boats, and has its entrance protected on the north-west side by a cape 200 feet high, on which stands a single cocoa-nut tree (1859). The coast between Á'chira and Sirjakot rivers is all sandy, with cocoa-nut trees, and sandy bottom extends from 1 to 2 miles off shore.

The coast north of Á'chira forms in three sandy bays, and the same number of rocky points, to Mombri creek; in the middle bay is another creek, off the entrance of which is a little rocky islet. The shore is safe to approach into 5 fathoms.

* The steamer *Johnston Castle*, in 1865, split into two pieces on a sunken rock having only 6 feet water, with 5 and 7 fathoms around it. From the wreck the north end of Melundi fort bore E. by N., distant 2¼ cables. A buoy has been placed to mark the rock.

MOMBRI BAY, bearing N. by W. ½ W. 10 miles from Á'chira point, affords shelter from North-westers to small vessels, in 4 fathoms, sand and mud. Mombri point projects more than a mile to the westward of the creek's mouth, which is thus much sheltered, but only available for small boats.

DEOGHUR FORT north-west bastion, 1¾ miles north of Mombri point, is on the brow of a piece of table-land (on the south side of the entrance to Deoghur river) appearing sometimes like an island, but is really part of the mainland, being joined to it by a narrow sandy peninsula. Deoghur is an excellent little harbour, into which a small vessel in distress might run in the S.W. monsoon. The passage into this harbour is not 3 cables' lengths wide, and as rocks project a considerable distance from the north point of the entrance, a ship in running in for shelter, or otherwise, should, after getting into 7 fathoms, borrow near the Fort point, and anchor inside rather more than a cable's length from the base of the fort; when, after passing in, it is brought to bear W. by N., in 3½ fathoms, mud, at low water, where the water is smooth.*

TIDES.—It is high water, full and change, at 11 h.; ordinary springs rise 9 feet, neaps 4 to 5 feet. There is scarcely any stream of tide at the above anchorage in the harbour; though doubtless the strong freshets that come down in the S.W. monsoon would be felt; a vessel should then be prevented from swinging by a stern anchor. There is at that season a greater depth at low water by 2 or 3 feet than is shown on the large scale plans of the harbours along this coast.

JYGI POINT, which is one of the projecting parts of the Konkan coast, and may be looked upon as the south extreme of Viziadroog bay, is a low rocky point bearing N. by W. ¾ W. 10¼ miles from Deoghur. Another point (off which are rocks) bears from Jygi N.N.E. one mile distant, beyond which to the north-east and distant three-quarters of a mile is Viziadroog fort.

Geriah old flagstaff, often mistaken for that of Viziadroog, is on high ground about 1½ miles E.S.E. of Jygi point. There are 6 sandy bays along the coast between Deoghur and Viziadroog.

VIZIADROOG HARBOUR, on the east side of the old fort of Viziadroog, or Geriah, stands 2 miles north-east of Jygi point. The point, on which the fort stands, forms the south side of the river entrance; the upper level of the fort is 100 feet, and the flagstaff 170 feet, above the sea. The land on the south and south-west, being higher, hides the fort from vessels

* *See* Chart of Deoghur, by Montriou, No. 59; scale, *m*=8 inches.

coming from the south, and they often set Geriah old flagstaff as that of Viziadroog.

The fort of Viziadroog, situated on a neck of rocky land, is of considerable extent; the walls have been very strong, but the work of decay is going on through the slow but sure agency of the trees and creepers which have taken root in the insterstices of the walls. There are two or three breaches in the wall on the west side, close to the water's edge.*

This river is navigable at high water as far as Wagótun (at the foot of the Phunda Ghaut) by vessels drawing 7 feet. Canoes can go up to Káriputtan, more than 20 miles from the mouth.

Though Viziadroog river is said to have no bar, (a circumstance which may be attributed to the absence of sand along the coast to the north), there is a flat to the east of the fort, on which the depth of water is a little less than will be found further in, the bottom clay and sand. This harbour is accessible to vessels during the S.W. monsoon; in the height of which, steamers of the Indian navy conveyed troops there during the Indian mutiny.

Anchorage. — A vessel may run in boldly, and anchor in 3½ fathoms, mud and clay, at low water, with the extremes of the fort bearing from W. to S.W. Further in than this position the wind would probably fail or be adverse, so it is better to warp further in at high water, taking up a position abreast the town on the west side of the river, half a mile south-east of the fort, moored head and stern, with the best bower to the ebb, which in the freshets runs at the rate of four knots an hour.

The deep water is on the west side of the river, and there is not room for a large vessel to swing, except at high water. At the distance of two miles from the fort, on the same side of the river, is an old dock, built by Angria, the pirate chief, many years ago; it appears excavated out of the rock, and was capable of receiving vessels of 500 tons, but is now almost filled up.

In the fine season a ship may anchor in the bay anywhere as most convenient.

TIDES.—It is high water, full and change, at 11 h.; springs rise 9 feet, neaps 5 feet. Night tides are higher than day tides in the N.E. monsoon, and the contrary in the S.W. monsoon, during which 2 or 3 more feet of water than the chart shows will be found at low water in the daytime, when only vessels should attempt to run in, as there are no lights.

ANGRIA'S BANK, which is outside the regular bank of soundings off the Konkan coast, is in the latitude of Viziadroog, its eastern edge being distant 60 miles. This bank is 20 miles in length north and south, and 15

* *See* Chart of Viziadroog or Geriah by Montriou, No. 58; scale, $m=4$ inches.

miles east and west, composed of sand, shells, and live coral. The least water found in 1847 was 11 fathoms, and a sensible rise and fall of nearly 1½ fathoms at high springs was found there, the time of high water being about one hour earlier than at Viziadroog.

Off Viziadroog the regular bank of soundings extends 55 miles, and between it and Angria's bank there is a narrow gut with a greater depth than 100 fathoms.

RÁJAPUR BAY, 3 miles north of Viziadroog, gives shelter from north-west winds; and Tulsunda cove, on the south side of this bay, is accessible to small vessels when overtaken by a south-west gale. The river runs up to Rájapur, 15 miles from its mouth, but is not navigable by coasting vessels so far; the bar is very shallow, and canoes only can enter at low water. The times of tide, and rise and fall, are the same as at Viziadroog. The table-land between Viziadroog and Rájapur is about 140 feet high, and projects one mile to seaward of a line drawn between the fort of the former and the point of the latter, which are in the same meridian.

Holi, or Three-tree hill, a round sloping mount 300 feet high, at the distance of 2 miles E.S.E. of Rájapur point, is a good mark to point out Rájapur, for the table-land of the Konkan has everywhere almost the same appearance, and about an equal height.

AMBOLGHÚR REEF of sunken rocks, upon which the sea breaks generally, except at high water, lies one mile north-west of Rájapur point, and half a mile south-west of Ambolghúr point, in the little bay to the east of which is the town of that name. Vessels should not shoal under 8 fathoms near this reef, although the neighbouring coast is safe to approach into 6 fathoms. The tower on Rájapur point in one with Holi hill is the line of bearing of Ambolghúr reef.

Ambolghúr point is a small piece of table-land, joined to the main by a sandy isthmus, and this sand extends northward nearly 3 miles to the town and little backwater of Yetia, from which place to Póranghur is rocky table-land, except at the mouth of Muchkundi river.

PÓRANGHUR FORT (formerly erroneously styled Radjapour) bears due North 16 miles from Jygi point, and is 12 miles above Rájapur bay. The fort is situated on the brow of a barren hill, and under it, on the south-east side, is the entrance of Muchkundi river, only available for small coasting vessels at high water. Pent, the principal town, lies just within the entrance, at the foot of Póranghur hill, and north-east of the fort. The pagoda on the sand, close by the river, after which early navigators called this place Pagoda cape, is not now kept so white as formerly, and is much hidden by cocoa-nut trees. Póranghur outer point is one mile north-west of the fort, and affords no shelter in the bay.

PÁOS BAY, the north-west point of which is 5½ miles N. by W. from Póranghur, is a snug and deep little cove, affording sheltered anchorage during North-westers, in 4 or 5 fathoms, mud and sand. The town of Páos is about 3 miles up a little creek.

The coast between the two above places is rocky table-land, with 4 or 5 little sandy bays, and safe to approach into 5 fathoms. The land, at the back of Póranghur, Páos, and Ratnaghíri, gradually rises from the sea coast, in undulating hills, till at 5 or 6 miles distance it is from 600 to 700 feet above the sea, but has no remarkable features. Hurchiri round wooded hill, 8 miles E.N.E. of Páos bay, is 890 feet high, and conspicuous at the back of the above land.

RATNAGHÍRI FORT south bastion, bearing N. ½ W. 6 miles from Páos point, is on the highest end of the fort, 300 feet above the sea. This fort covers a large headland connected by a narrow sandy neck with the main, and when viewed from a distance appears insulated, flat, and level like a wall, but the south end rises higher and attains the elevation above mentioned. The northern part of the fort (separated from the rest by a valley) has a perfectly flat top 200 feet above the sea, and covered with trees, within stone walls; on the east side of this a cove is formed between two points, most useful to the coasting trade during the fine season, but the water is too shallow to admit of small vessels finding shelter during the S.W. monsoon, as formerly supposed practicable.

On the south side of Ratnaghíri fort a large bay is formed, from whence a river, capable of receiving small vessels over its bar at high water, extends some distance inland, having on the north side of the entrance, on the brow of a hill elevated about 150 feet above the sea, the Událut, or judge's court-house, a large building, with other houses to the east and north. Boats should not attempt to run into the river except towards high water.

The landing place in Ratnaghìri bay during north-west winds is on the east side of the south fort near to a small tower, the base of which is washed by the sea at high water, but a good look-out must be kept for rocks. In the south-westerly sea breezes, which sometimes come in the fine season, lasting about three days, there is such a swell rolling up to this landing place that it is recommended not to attempt landing there on such occasions, but to send the boat round to the little bay to the northward and eastward of the north fort. At high water, if the bar does not break, a large boat may with more convenience run into the river.

At the south extremity of the bay there are some rocks above water, about half a mile from the shore, with a shoal bank of 2 to 3 fathoms rocky ground extending to the westward, the outer edge of which bears South from the southern bastion of the fort, and its northern edge bears

S.W. from the Událut. A vessel coming from the southward should give this foul ground a wide berth, a depth of 7 fathoms being close to it.

The large banyan tree, noticed by Horsburgh as being on a hill to the southward near the sea, is no longer visible ; but the fort of Ratnaghíri, and Méria Donghur, the high hill to the northward, unmistakeably point out this place.

Tides.—It is high water, full and change, at Ratnaghíri at 10 h. 30 m. ; ordinary springs rise 8 feet ; high springs 9 feet ; neaps 5 feet.

MÉRIA DONGHUR is a headland of high round form, lighter in colour than the other land, and appearing like an island when seen from northward or southward. Its highest part is 475 feet above the sea, and at the distance of half a mile within the south-west point of this headland which forms Méria Donghur bay. This south-west point bears N.N.W. 2 miles from the south bastion of Ratnaghíri fort. A deep bay is thus formed between that fort and Méria Donghur, the entrance to which is 1¼ miles wide ; but a sunken rock, on which the sea breaks at low water, lies in the centre, with 5 fathoms round it, and 7 fathoms at the distance of 3 or 4 cables' lengths to seaward. This dangerous rock in the centre of the bay between Méria Donghur and Ratnaghíri fort, appears not to have been known to early navigators, who said "the landing place "is on the north side of the fort, where there seems to be shelter for small "vessels during the S.W. monsoon." The bay on the south side of Méria Donghur affords shelter from north-westers, in 3 or 4 fathoms, mud and sand ; but the above sunken rock must be avoided, and other rocky patches lying close to the cliffs.

Kalbadévi Bay.—The sea face of Méria Donghur headland is nearly 2 miles long, and on its north side a deep bay affords sheltered anchorage from southerly winds, in 5 fathoms, mud. During the Indian mutiny (1857), advantage was taken of the shelter afforded in this bay to land troops during the S.W. monsoon near the mouth of Kalbadévi river, the entrance of which is close to the rocky cliffs, on the north-east of Méria headland. It has been already mentioned that, when the S.W. monsoon is in full force, there is at low water, in the daytime, half a fathom more water than the chart shows, in all the bays along this part of the coast.

WARÓRI, a little bluff point (projecting to W.N.W. about a mile from the regular line of coast) bears N. by W. 10½ miles from Méria Donghur. Half way along the intermediate coast, which has 4 sandy bays, is Neori point, on the south side of which small coasters find shelter from north-west winds. The coast is safe to approach into 5 fathoms. On the north side of Warórí point is a little bay and river, similar to that of Kalbadevi,

but of smaller extent, giving shelter to coasters from southerly winds, in 3 fathoms, sand and mud ; at high water, when they get 6 or 7 feet on the bar, they slip into the river of Warórí.

Amwah Bay, formed under the south side of Michi-donghur, (a prominent piece of table-land, about 120 feet above the sea, and connected with Jyghur headland by a sandy plain,) is 4¼ miles N.N.W. of Warórí, and gives shelter from north-westers in 4 or 5 fathoms, sand and mud, with the point bearing W. by N. or W.N.W. In the bight, between Warórí and Amwah, are five sandy bays and four rocky points, safe to approach into 5 fathoms.

JYGHUR POINT, 7 miles N.N.W. of Warórí point, is a level headland, upwards of 100 feet above the sea, covered with brushwood, and forming in three distinct projecting points ; between the two northernmost points stands Karhteshwur, an old Hindu temple, on the brow of the hill. Jyghur headland is a level plateau near the sea, but rises gradually to the south-eastward, where two hills, 3 and 4 miles from Karhteshwur, and to the east of Amwah bay, attain respectively an elevation of 370 and 380 feet.

Dumkhul Bay, intermediate between Jyghur point and fort, is a deep little cove, quite open to northerly winds, but giving shelter from southerly winds, in 4½ fathoms, mud, at low water, 3 cables' lengths off shore, by bringing the outer point to bear W. by N., and the single large tree in the bottom of Dumkhul bay bearing South. This is a snug little anchorage in the S.W. monsoon, where large vessels may venture.

Jyghur or Shastri River. — Jyghur fort, on the eastern extreme of the headland, and bearing E. by S. 1½ miles from the outer point, looks down upon the entrance of this fine river which, from its sources in the Ghauts, receives, at the distance of 18 miles E.S.E. from its mouth, the waters of three tributaries, the Báo, the Gurni, and another ; its lowest reach trends to the northward along the east face of Jyghur headland, and, discharging its waters at two places, forms a sand-bank between them.

The principal channel, having 3 fathoms at low water, is under the fort, close along the cliffs, which must be hugged to avoid the above sand-bank. Within the fort point the water is deep on the south side of the river, forming a safe harbour for shipping against all winds.

The northern entrance (which has nearly as great a depth as that by the rocks, but with more breakers,) is half a mile north of the fort, and still further northward there is a reef of rocks projecting half a mile from the northern cliffs, which are separated from Jyghur fort by the space of 1¼ miles. The little village of Bunder, in a bight to the eastward of these rocks, is at the bottom of Jyghur bay, which, between Karhteshwur and Bunder, is more than 3 miles deep.

It seems strange that some attention has not been paid to the Port of Jyghur, which affords remarkable facilities for a commercial port, accessible during the S.W. monsoon.

BÓRIA POINT, a high round bluff headland, pointing to the north-west, with a small temple on its highest part, at an elevation of 360 feet above the sea, bears N. by W. ¼ W. 6¼ miles from Karhteshwur temple. Bória headland extends more than 1½ miles to the south-east of the temple, and forms on its south side a deep bay, in which vessels find shelter from north-westers, in 4 or 5 fathoms, mud, with the point bearing W. by N. or W.N.W.

The coast between Jyghur and Bória forms a deep bay, 2 miles deep and 5 miles broad; the shore, which is divided by rocky points into 6 or 7 little sandy bays, is safe to approach into 5 fathoms.

Tides.—The rise and fall of tide in Bória bay was found to be 10 feet at ordinary spring tides, and 6 feet at neaps; high water, full and change, about 10 h.

ANJENWÍL RIVER.—Tolkeshwur pagoda, 10 miles N. ¾ W. from that of Bória, is on the edge of a plateau, 300 feet above the sea, and overhangs the south side of the entrance into the Dábhol, or Anjenwíl river, a considerable stream, having 10 feet on the bar at low water, and the rise and fall of tide is 10 feet at springs; but, from the bar being so exposed, there is generally a swell on it. The passage over the bar is about 2 cables' lengths from the rocky cliffs on the south side of the bay, and bears N.W. from the old Tolkeshwur pagoda on that table-land.

There is also an old fort overhanging the river entrance, and bearing from Tolkeshwur N.E. by E., at half a mile's distance.

Inside of the bar there is deep water, 5, 6, and even 9 fathoms being found close along the south rocky shore. The sand-bank from the north shore projects about a mile to the south-west, reducing the breadth of the deep water channel to less than 2 cables' lengths. The river within the fort point is wider, and extends a great way inland.

Anjenwíl Town is on the south shore of Anjenwíl river, in a little bay within the entrance.

Dabhol, the principal town on Anjenwíl river, formerly having a great trade, is on the north bank of the river, 2½ miles within the bar.

The COAST.—From Bória to Bankot the coast consists of a series of plateaux, varying in height from 200 to 600 feet, and having here and there a remarkable peak. Occasionally there is a narrow strip of land between the plateau and the sea, but generally the descent is sheer down to the high water mark. Trees are scarce, and the jungle consists

of sparse bushes, so that from any considerable distance the land appears quite bare. The Ghauts are about 25 miles from the sea.

On the north side of Bória point the coast recedes, forming a bay, and $2\frac{1}{2}$ miles to the north-east of the temple is the little bay of Palshet, but neither afford such shelter as is obtainable at Jyghur or Anjenwíl rivers.

Pir Bálu, or Bála Pir, is a tall conical hill, crowned by a Mahomedan temple, on the north side of the Anjenwíl river, and $4\frac{1}{2}$ miles E.N.E. of Tolkeshwur, and forms an excellent and unmistakeable landmark. The coast between Anjenwíl and Herni is high and safe to approach into 5 or 6 fathoms; midway is the little bay of Burondi, which seems to afford shelter from southerly winds to small vessels.

Herni, a town 15 miles N. $\frac{1}{2}$ W. of Anjenwíl temple, has a little bay (to the south of the forts of Severndroog and Herni) affording shelter, for small boats only, from north-west winds, but there are many rocks in the bay.

Severndroog, a low fortified island, about half a mile west of Herni fort, is covered with jungle, but being close to the main land, and under a range of hills about 500 or 600 feet high, is not easily seen from seaward. There are rocks to the south of Severndroog, and it must be remembered that Herni anchorage is not close to Severndroog, but to the south of the little island which is three-quarters of a mile S.E. of the latter fort, and off that island sunken rocks extend more than a quarter of a mile to the westward. A vessel communicating with Herni may anchor in $4\frac{1}{2}$ fathoms, mud, with Severndroog fort bearing N. by E. about one mile distant. The Jog river is 2 miles northward of Severndroog.

BANKOT, on the Mhar, or Savitri river, is 10 miles N. by W. $\frac{3}{4}$ W. from Severndroog fort, and may be recognized by a small dark conical hill, called Harissa, projecting into the sea on the northern side of the bay, and by the black walls of fort Victoria overhanging the south side of the river, on a barren plateau of reddish appearance.

The channel is on the south-east side of the river entrance, but being narrow it ought not to be approached without a pilot; the bar, which is very much exposed, and has heavy breakers almost always, is now well buoyed. A vessel may anchor in 5 fathoms, off the bar of Bankot river.

Tides.—The bar of Bankot river, about a mile outside of the rocky cliffs, and 2 miles W.S.W. of fort Victoria, has 9 feet on it at low water; the rise of tide is 11 feet at ordinary springs, and at neaps 6 or 7 feet; high water, full and change, at about 10 h. 30 m.

Soundings.—The coast between Bankot and Severndroog is clear into 5 fathoms, but under that depth are patches of hard ground near Kelsi river, which is in a little bay 3 miles S.S.E. of Bankot. Four miles

S. by E. ½ E. from Bankot, and at the distance of three-quarters of a mile from shore, there is a rock, awash at low water, having 4 fathoms very close outside of it.

KUMBÁRU POINT, 16 miles N. by W. ½ W. from Bankot, is the north point of the bay of that name (formerly called Comrah), affording shelter from north-west winds to vessels of considerable size.

This point projects more than one mile from the regular line of coast, and is high and steep-to. The hills overhanging Kumbáru bay are 800 feet high, and heavily wooded. At the south extreme of Kumbáru bay there is a rock, on which the sea breaks, near the shore in 3 fathoms. Five miles to the north of Bankot is the little bay of Srewerdun, affording shelter to small coasters from north-west winds.

It must be remembered that the portion of coast comprehended between Bankot and Choul belongs to Hubshi, an independent State.

RAJPÚRI, the capital of the Hubshi State, is on the north side of the Rajpúri river, which is rather an extensive backwater, receiving the drainage from the hills within a radius of 12 miles, and subject to the ocean tide, which here rises 12 feet at high springs. The district is known as that of Jinjíra, and also Hubshi Rajpúr. From seaward the country appears densely wooded. The Rajah is a Muselman, whose ancestor, an African, being the Sidi, or chief of Jinjíra, an admiral under the Great Mogul, assumed independence on the decline of the realm of Delhi.

The Whale Reef, lying nearly 1½ miles W. by S. of Rajpúri point, and bearing N. by W. ½ W. 3½ miles from Kumbáru point, is a breaking patch of rocks, partly dry at low water, having 4 fathoms between it and the main, and 4½ fathoms one mile to seaward. It lies 3½ miles S.W. by W. ½ W. of the island-fort Jinjira, from which it is visible just clear of Rajpúri point. From the Whale reef Kánsi fort bears N.N.E. 3 miles.

Jinjira and **Kánsi** are 2 island-forts lying on the north side of Rajpúri river entrance. Kánsi, 2½ miles north of Rajpúri point, and about the same distance to the north-west of Jinjira, is a dilapidated fort, standing in 3½ fathoms water, more than a mile from the mainland. Jinjira, where the Rajah has his palace, is separated from the south shore of the river by more than a mile of deep water, and from Rajpúri town by a shallow channel one cable's length wide. Jinjira is full of houses, which show above the fort walls, and it has a flagstaff. Formerly it was a place of high importance. During the existence of the Muselman monarchy of Beejapoor, it was the principal depôt of the maritime force of the Sidi, or African admiral of that State, who held his dignity on condition of maintaining a fleet for the protection of commerce, and conveying pilgrims to the Red Sea. The Mahrattas frequently attacked it in vain.

The south point of Rajpúri bay is commonly called by navigators Rajapoor point; but, as stated above, the town of that name is on the north shore.

Rajpúri River is an excellent harbour, without the usual bar of sand that is found at most river mouths along this coast, but having 3½ and 3¾ fathoms, at low tide, as the shoalest water in its entrance, and 4½ fathoms inside in mid-channel, over a muddy bottom; thus affording excellent shelter to a vessel in distress at the distance of 25 miles to the southward of Bombay.

Soundings.—Midway between Kánsi and the Whale reef there is a depth of 4½ fathoms, mud, at lowest tide, and after half-flood a large vessel can boldly run in, and anchor half a mile to the southward of Jinjira, in 4 fathoms.

TIDES.—It is high water, full and change, at 10 h. 45 m.; ordinary springs rise 11 feet, and neaps 6 or 7 feet. Off Rajpúri the tidal influence is strongly felt, increasing gradually as the vessel goes further north, in beating up to Bombay.

The COAST, between Bankot and Choul, is hilly and well wooded, and of considerable elevation. Rajpúri headland is prominent, and its peak is a good landmark, but liable to be mistaken for Choul peak, which is some 15 miles further north. A ship may, between Bankot and Choul, stand into 6 fathoms at low water, but as the rise and fall at springs is 2 fathoms, it is a safe rule never to shoal under 8 fathoms, unless well informed of the time of tide. Five miles S.S.W. of Choul there has been found a patch of 3 fathoms only, with 6 fathoms close to seaward of it; this patch is nearly 2 miles off shore.

Choul town is on the north side of its river, which is called Kundali-ka-kári, but Horsburgh states "that the high land of Choul is even, forming "a bluff to the northward." The high land of Kurla is evidently meant, and what navigators call Choul Knob is Kurla Knob, the highest peak of the range situated to the south-east of Kurla fort.

On the north of Choul is the high land of Kolába, appearing in undulating hummocks; that part called the hummocks of Thull, bears from Kurla fort due North nearly 10 miles. On its north-west extreme, more prominent than the rest, stands Kankeshwur, a tabular hill, the single tree peak of which, called Ramdhurna (One-tree hill on the charts), is the leading feature of the southern hummocks of Thull, elevated 1,060 feet above the sea, and situated 2½ miles from the beach, and 5 miles east of Kundári island. Keyim bungalow is on the beach, nearly 3½ miles N.W. from One-tree hill.

Choul Harbour (which is just inside the river of that name) lies between the towns of Kurla and Choul, 16 miles north of the Whale reef. This

harbour is only available by small coasting vessels ; the entrance is between Kurla fort and a spit dry at low water, extending to the west off the fort of Rewadunda and town of Choul on the northern shore.

Kurla Fort, commonly called Choul fort, is an easily recognized landmark, being a hill, like an island, of reddish earth, standing out in distinct contrast to the background of darkly wooded hills ; but at times, when the sun is over the land, and Kurla fort and high land at the back are viewed on a bearing to the southward of East, this place may be (as before stated) mistaken for Rajpúri, as the hill called Choul Knob, about 2 miles E.S.E. of Kurla fort, somewhat resembles Rajpúri peak.

Fishing Stakes. — Off Choul the fishing stakes are very numerous, lying out during the fine season in 8 fathoms at low water, and so far as 8 miles from the shore.

Kolába Island, a little fortified islet, lying off the town of Alibagh, bears from Kurla fort N.N.W. 6 miles, and being low is not easily distinguished from seaward ; this part of the coast is quite unapproachable, owing to the numerous outlying rocks.

Choul Kádu is a rocky patch, with 2 fathoms on it, bearing from Kurla fort N.W. ½ W. 5 miles, and from Kundári island South 7½ miles. It is the outermost of several patches lying off Kolába and Choul, the whole of which are known to the natives as Choul Kádu.

KUNDÁRI ISLAND, or Kenery, bearing N.N.W. ¾ W., and 11 miles distant from Kurla fort, is surrounded by a high wall, is well wooded, and has two mounds, the southernmost of which, slightly the highest, is 120 feet above the sea. Kundári lies 2½ miles from the mainland, and 1½ miles to seaward of its sister island, Unári, or Henery, which is very low, with ruined fortifications and a few palm trees.

The channel between these two islands is only available for small coasters. Kundári is on the meridian of Bombay lighthouse, from which it is distant 11 miles. This island is just discernible at low water from the decks of ships in Bombay harbour, 13 miles off ; so that it may be said to be first visible from a distance of 12 miles in very clear weather ; but, having the high land of Thull behind it, is not easily perceived from a ship's deck from seaward till within 10 miles.

SOUNDINGS.—Between Kundári and the main are several rocky patches ; and to the westward of the island the water is shoal to a considerable distance, but free from dangers. Over this Kundári mud flat a heavy ground swell rises in the S.W. monsoon, liable to make ships labour very much.

Direction Bank, about 30 miles to south-westward of Kundári island, is a good guide, which has on it from 22 to 28 fathoms, coarse sand and small shells, with 30 and 32 fathoms, mud, within it. In approaching and

crossing over this bank from the westward, you pass over 30 or 40 miles of the Fifty-fathoms flat, then gradually shoal to 40 fathoms, then suddenly to 30 and 23 fathoms on the Direction bank; after which the water deepens again to over 30 fathoms between the bank's north extreme and Kundári island, or to rather less than 30 fathoms inshore of the south end of the bank.

Southward of the latitude of the Direction bank, you rapidly shoal from 40 to 30 fathoms, and then take a long time to get into 20 fathoms, which depth is about 17 miles from the land.

Northward of the Direction bank, you take a long time in changing the depth of water from 40 to 30 fathoms, but then rapidly shoal to 20 fathoms, which depth is about 15 miles seaward of Kundári island or the Outer Light vessel.

The Fifty-Fathoms Flat.—This is a great flat, extending over a space of 50 miles of longitude and 20 miles of latitude—between the same parallels as, and commencing 20 miles to the westward of Direction bank—on which will be found from 48 to 50 fathoms, fine sand, although occasional casts of muddy bottom are found in the space which connects the two banks. But to the south-west of Direction bank the bottom is more uneven, having overfalls from 50 to 55 fathoms, and occasional casts of mud as well as sand.

On the parallel of Kundári, when within 80 miles of that island, the soundings are 50 fathoms, and decrease very regularly in steering to the eastward; but in about the meridian of the south point of Katiawár, and 110 miles due West of Kundári, there are shoal patches of 38 and 43 amongst the general soundings of 50 fathoms.

The entire bank of soundings along the Malabar coast, and off Bombay, from Angria's bank on the south to Diu head on the north-west, has now been examined, and a little pamphlet, to accompany the chart by Captain Selby, is published.*

APPROACHING BOMBAY HARBOUR.—During the fine season, from November to February, when land winds prevail during the night, lasting till 10 h. in the forenoon, and sometimes till noon, a ship approaching Bombay harbour from the southward should have hugged the coast all the way, taking care of the fishing stakes, which lie out in so much as 8 fathoms at low water. Off Bankut the influence of the tides is felt, and it must be remembered that they will sensibly help or retard a vessel.

From March till the S.W. monsoon begins in the end of May, or early in June, and again (after the rainy season) in the month of October, the winds off this coast are principally North-west, veering to W.N.W. or

* *See* Chart:—Bombay bank of soundings, by Selby, No. 254; scale, $m = 0{\cdot}1$ inch.

West from the forenoon towards sunset, then N.W. till midnight, and to N.N.W. or North from midnight till the forenoon.

In the S.W. monsoon, a ship steering for Bombay harbour, from the middle of May till August, may sometimes have steady gales and clear weather until she get within 25 or 30 leagues of the coast; but cloudy weather with rain and squalls may be expected on the bank of soundings, as she advances near the land. In June and July, more particularly when the S.W. monsoon blows in full force, such weather is frequently experienced, precluding observations; she ought therefore to have good topsails and courses bent, that she may haul off and keep at a reasonable distance from the land, in case dark blowing weather should prevent the latitude from being correctly ascertained. For, in dark stormy weather, it would be imprudent to run for the harbour, if the latitude is not obtained by observation of sun, moon, or stars; unless, by having taken and noted down a careful series of soundings, together with the times, courses, and distances run, the navigator is enabled to project his track, with the ascertained depths at their proper intervals, on a piece of tracing paper, according to the scale of his chart; and then by moving about this transparent paper over the chart, carefully preserving his meridian, until the coincidence of the depths on the two is apparent, he cannot fail to recognize both the ground he has gone over and his present position, when he may boldly stand on.

When a ship has obtained soundings in the S.W. monsoon on the edge of the bank, large snakes will be perceived if a look-out is kept for them; these diminish in size as the depths on the banks decrease, in running towards the land. If not exactly certain of the latitude, it will be prudent to keep in from 18° 15′ to 18° 25′ North latitude, and endeavour to get soundings on Direction bank, after passing over that extensive flat to the westward of it, which has such regular soundings over an area of 1,000 square miles; the average depth being 50 fathoms, and not varying in depth 2 fathoms, either more or less; it has therefore been called the Fifty-fathoms flat.

During the early part and strength of the S.W. monsoon, great care must be observed not to get to the northward of the entrance of the harbour, for then the current of the flood tide, as well as the heave of the southerly swell, acting upon a vessel, (occasionally stopping or heaving-to for the purpose of sounding,) frequently set ships along the bank toward the Gulf of Cambay; and if a ship get to the northward of the harbour, late in May, June, and July, she may find it very difficult at times, if not impossible, to work round the South-west Prong.

By getting to the northward of the harbour in June several ships have been driven on shore in Back bay. The *Shah Byramgore*, in a heavy

gale that set in after she had worked out of the harbour, was forced to the northward of it, driven on the rocks near Versovah, where most of the crew perished, and the ship was wrecked. Several ships have been lost to the north of Bombay, and others have been in distress, and with great exertions got round the South-west Prong into the harbour. An American ship bound to Bengal, many years ago, had a narrow escape; she fell in with the high land of St. John, to the north of Bombay, when by *dead reckoning* near Point Palmiras, in the bay of Bengal. This happened when the S.W. monsoon was blowing strong, late in June. Being a fast sailing ship, she cleared the shore under a press of canvas, passed Bombay stood to the southward, and arrived safe at Madras.

Therefore, in these months, a ship should steer direct for Kundári island, allowing for a northerly set on the flood tide—though an examination of many ships' logs shows that the prevailing set of current off the harbour, after the first burst of the monsoon, is to the southward—and endeavour to make the island bearing between East and S.E., taking care to borrow a little either way, as prudence may dictate and circumstances require, to carry a fair wind in entering the harbour. If the wind incline to blow in squalls from West or W.N.W., take care not to run too close in with the land to the southward of Kundári island, nor even approach that island too near, on account of the flat which extends 4 or 5 miles westward of it, as there might be difficulty in weathering it with these winds, which are sometimes experienced in June and July, but more expected in August.

In August and September the squalls come mostly from West and W.N.W., and the freshes from the rivers and gulf of Cambay set to the southward; it is therefore not so dangerous, at this late period of the season, to get to the northward of the entrance of the harbour, although it is still prudent to fall in with Kundári island bearing but little to the southward of East, that no time be lost in entering the harbour.

It has been observed at Bombay that the first stormy weather of the S.W. monsoon seldom comes with the full moon springs, but generally during the dark nights. Although Southerly winds prevail after the middle of May, the stormy weather and rain usually do not set in until the dark nights, some time between the 4th and 15th of June. From the 8th of this month to the 15th or 20th of July the weather is generally most unsettled and severe; hard squalls, much rain, and dark cloudy weather, may then be frequently expected in the vicinity of Bombay harbour.

BOMBAY HARBOUR* is very capacious, being 12 or 14 miles long from North to South, with a general width of from 4 to 6 miles. Its shores are

* *See* Chart:—Bombay harbour, by Whish, No. 2,621; scale, $m = 1{\cdot}5$ inches.

irregular, and indented by numerous bays and inlets, and it contains several islands and banks. The usual anchorage is on the west side of the harbour, off the town of Bombay, which stands on the south-east point of Bombay island. The town of Bombay is well fortified. Being essentially a commercial port its population varies considerably, and consists of Persians, Arabs, Sidees, Mahrattas, Carnatas, Indo-Portuguese from Goa, and a great number of sailors of all nations; the entire floating population has been estimated at 229,000 souls. The Docks, which were built by the late East India Company, are under the management of Parsees, by whom the shipbuilding is conducted. The ships built at Bombay include merchant vessels of very large tonnage, occasionally frigates, and even ships of the line, the timber being amply supplied from the neighbouring districts of Malabar and Gúzerát.

Colába Island, which forms the northern entrance point of the harbour, is low, with a small elevation at the south end on which the lighthouse stands, bearing S.W. by S. from Bombay castle, distant 2½ miles. What was Colába *island* is now part of Bombay island, being joined to it by a substantial causeway, or velard; the land on the north side of which (between the two large blocks of houses on the Arthur pier, called Grant's buildings, and the cooperage on Mendin's point at the south end of the esplanade) is being rapidly filled in by natural and artificial agencies. That part by the lighthouse is Bara Colába, the other half is Chota Colába. Houses and patches of trees connect the lighthouse point with the fort of Bombay. The northern extreme of Colába is formed by Grant's buildings, two large blocks of warehouses on the Arthur bunder, the head of which is the north-east point of Colába, Jamsetji bunder being situated 2 cables to the south-west of it, nearly abreast of the Dolphin beacon.

Oyster Rock, formerly having a white beacon, 24 feet high, but now built up as a battery, lies at the distance of one mile E.N.E. from the lighthouse, and one mile N.N.W. from the Inner light vessel.

The high land on the south side of Bombay harbour, and the several islands lying within it, most unmistakeably point it out in the daytime.

The High Land of Thull, north-east of Kundári island, is more than 1,000 feet high in its southern part, and is separated by a low ridge from the hill of Ramdhurna, or tree peak, which has been before described. On its northern declivity there are, near each other, two small hummocks called the Paps.

The Paps, bearing from Thull Knob S.E. by E. ¼ E. 3½ miles, though not very conspicuous to a stranger, are an excellent mark for pilots.

Thull Knob, a useful mark, in thick weather, for avoiding the dangers at the entrance of the harbour, bearing S.E. ¾ S. nearly 7 miles from the lighthouse, is a round hill on the north point of Thull, 160 feet high, with

a tree on its summit, which distinguishes it from a similar little hill of rather less elevation a little further to the south and westward, and called False Knob. In thick weather these little hills stand out well amongst the cocoa-nut trees, being detached from the more distant highland.

Gull Island, or Kásoa, is a little rocky islet at the entrance of Penn river, and rather more than 2 miles N.N.E. of Thull Knob.

Great Caranjá is a large isolated hog-backed hill, about 700 feet high, with a steep declivity at each end, called the north and south brows; the latter, which is steepest, is 4 miles north-east of Thull Knob.

Little Caranjá hill, about two miles N.N.W. of the great hill, has an irregular outline, with a mosque on the north end of its summit which is 690 feet high. Both these hills stand surrounded by cocoa-nut trees on the low and woody island of Woorun, or Caranjá, or Carija, the sea face of which is 4 miles long on the east side of the harbour.

Funnel Hill, or Kurnáli, a remarkable peak resembling a chimney, standing 10 miles to the eastward of Caranjá, is a good pilot mark in clear weather.

Elephanta Island, or Garapóri, high and densely wooded, and having two peaks which are in one when viewed from the anchorage of Bombay, lies 4 miles to the northward of Little Caranjá, and bears E.N.E. 5½ miles from Bombay castle.

Butcher's Island, or Derdiwi, a small low island, with a tower in the centre, and a large tree near its south-east end, is situated rather more than one mile to the west of Elephanta, or 4 miles N.E. by E. ½ E. from Bombay castle flagstaff.

The above are all the useful marks on the east side and middle of the harbour; those on the west and north have now to be described.

Malabar Hill is about 150 feet high, having a regular oblong appearance sloping a little towards the sea, and covered with houses and trees; at the point is one of the Governor's houses with a signal-post and flagstaff. The deep bay between Malabar hill and the lighthouse is called Back bay.

The North-East Bastion of Bombay castle is the most prominent angle of the works towards the harbour. When abreast of the Sunken Rock shoal, coming up the harbour, this bastion is not easily distinguished from the wall of Fort George, which is on higher ground a little farther northward.

Cross Island, or Gibbet island, is small, formerly resembling a hay-cock, but now cut down for a battery, and lies about 1¼ miles to the northward of the anchorage off the town, and half a mile from the nearest part of the shore. A shoal projects nearly half a mile from it to the S.W.; but there is a narrow passage inside between this shoal and the bank which lines the main shore.

Mazagon Hill, on which is Belvidere house, situated 2 miles to the northward of Bombay castle, is of middling height, not easily known till well up the harbour.

Parell Hill, 2 miles farther northward, is a round mount having on it a flagstaff; but this, and an oblong hill near it covered with trees, are not perceived till far up the harbour.

Suri Fort (Sewree) is on a point of land overlooking the harbour, to the eastward of Parell, and more than 2 miles N.N.E. of Mazagon hill.

Neat's Tongue, or **Tromba** highland, deriving its name from its remarkable aspect when viewed from the south-west, has a little mosque called Pau Pir on its tip or south end, by the margin of the water in the harbour. From this tip of the Tongue the hill rises in a gradual slope to the north for 2 miles, and there attains its greatest elevation of 980 feet above the sea. The mosque on the tip of Neat's Tongue bears N.E., and is 6 miles from Bombay castle.

BOMBAY LIGHT, *revolving* every 2 minutes, is on a circular white column, at a total elevation of 132 feet above high water mark, on the south end of Colába, where the land is 40 feet above the sea. The lighthouse is kept white, and may be seen a dozen miles off in clear weather, when the sun shines on it, but there is generally a haze about the entrance of Bombay harbour. At night the brilliancy of the light can be seen 17 miles from a vessel's deck, and considerably further from aloft. From the lighthouse the Outer light-vessel bears S.S.W. $4\frac{1}{2}$ miles, and the Inner light-vessel bears E.S.E. nearly $1\frac{1}{2}$ miles. Blue lights are burnt in answer to vessels doing the same, and signal guns are fired from the vicinity of the lighthouse.

OUTER LIGHT VESSEL is moored in 7 fathoms, low water, at the distance of $7\frac{1}{2}$ miles N. by W. from Kundári island.

This outer *fixed* light is exhibited on a mast at an elevation of 36 feet; the vessel's hull is painted red, she has a red ball at the masthead, and she hoists a red flag in the daytime, when a square rigged vessel is in sight. At night she burns a blue light every hour, and displays a torch at the half hour. The flood stream passes by her to the east-north-east, and the ebb stream to the south-west, the latter making at about 12 hours on full and change of moon, when the average rise and fall is 15 feet, and at neaps 9 feet.

From the Outer light the Colába lighthouse bears N.N.E. $4\frac{1}{2}$ miles; the Fairway buoy bears N.E. by N. three-quarters of a mile; the Inner light, or Sunken Rock vessel, bears N.E. $\frac{1}{2}$ N. $4\frac{1}{2}$ miles; the shoalest part of Thull shoal E.S.E. 2 miles; and the extreme foul ground of the South-west Prong bears North, less than 2 miles distant.

When the Outer light is seen, bearing on any point from N. by E. round by the eastward, as far as S.E. by S., a ship can steer directly for it; and, when up with it, should steer from it N.E. easterly, so as to pass half a mile to the eastward of the Inner light, or Sunken Rock vessel. After rounding the latter she may steer more northerly, and if at night should anchor with the Inner light bearing S.W. by S. distant rather less than a mile, and the Dolphin green light N.W. by N., where the water will be comparatively smooth in the S.W. monsoon.

Inner Light Vessel, or Sunken Rock vessel, placed about 2 cables' lengths to the southward of that rock, bears N.E. $\frac{1}{2}$ N., and is rather more than $4\frac{1}{2}$ miles from the Outer light, and nearly $1\frac{1}{2}$ miles to the E.S.E. of Bombay lighthouse. Her light is also a *fixed* one.

Both light-vessels are painted red, each carrying a red ball on the light mast, and during daylight they hoist a red flag when a sail is in sight.

Dolphin Light, *fixed*, is a small light placed on the Dolphin shoal, inshore of the man-of-war anchorage, and 1 mile South of the Castle flagstaff; it is on a stone tower, 20 feet above high water, and shows a green light to the south and east, white to the north, but is screened to the westward.

The FAIRWAY BUOY, a spire buoy, has been placed in the entrance of the harbour to guide ships into the fair channel during the S.W. monsoon, when pilots are prevented from getting out beyond the reefs on the flood tide. This buoy is placed between Thull reef and the Prongs, in $6\frac{1}{2}$ fathoms at low water spring tides, and $9\frac{1}{4}$ fathoms at high water, distant from the nearest part of Thull reef $1\frac{3}{4}$ miles, and from the nearest part of the Prongs $1\frac{1}{4}$ miles. Kundári island bears from it S. $\frac{3}{4}$ E.; the Outer light S.W. by S. $\frac{3}{4}$ of a mile; the lighthouse N. by E. $\frac{1}{2}$ E.; Thull Knob E.S.E., well open to the northward of the northern Pap; Sunken Rock floating light-vessel N.E. $\frac{1}{2}$ N., on with Butcher's island; the Oyster Rock beacon N.N.E. $\frac{1}{2}$ E., a little open to the east of Cross island.

Entering the harbour without a pilot, a ship should round the Outer light, or pass at a small distance to southward of the Fairway buoy: then steer N.E., N.E. by N., and N.N.E., if it be flood tide; but, if it be ebb tide, steer E.N.E., N.E. by E., and N.E. to avoid the South-east Prong, and afterwards be careful to pass outside, or to the eastward of the Sunken Rock vessel, or buoy, and then wait for a pilot.

THULL SHOAL, a patch of sand, rock, and mud, with a little under 3 fathoms least water, is $2\frac{1}{2}$ miles in extent north and south, and only half as broad. Practically the Thull shoal may be said to extend more than $3\frac{1}{2}$ miles to W.N.W. from the little hillock on the mainland with a tree on it, called Thull Knob; but there is a narrow passage through

this dangerous ground, with a depth of 5 fathoms, which may be sometimes taken advantage of; although the old leading marks, which are, the large tree on east end of Butcher's island and Tromba old church in one, are not very distinct.

This Shoal, the south end of which is situated 5 miles north of Kundári, may be considered during the S.W. monsoon the greatest danger in the entrance of the harbour, to ships at a great draught of water. The least water on it is now 17 feet, and it is generally composed of rocky bottom in patches, with large gaps of soft ground between them. The gap or channel of deep water and soft ground, extending N.N.E. and S.S.W., between Thull shoal and the shore reefs, seems to have shoaled since Cogan's survey, nearly 40 years ago.

The ship *Surat Castle* struck on one of the outer patches of rocks, lost her rudder, and narrowly escaped from being wrecked, by the high sea lifting her over it into the gap of soft ground inside, where there are two fathoms more water than on the outermost rocky patches.

The outermost part of Thull shoal, on which are only from 3 to $3\frac{3}{4}$ fathoms at low water spring tides, lies 3 miles W.N.W. from the nearest shore of Thull; and a direct line South from the lighthouse, just clears but nearly touches the western edge of the outermost patch of rocky ground. With Thull Knob bearing between E. $\frac{1}{4}$ N. and E. by S. the foul ground is very dangerous, for the rocky patches project farther out with this bearing, and the depth of water decreases very little near them. With such bearing of the Knob, approach no nearer the foul ground than to bring Kundári island S. $\frac{1}{2}$ E., or the lighthouse N. $\frac{1}{2}$ E.; or keep the latter a little open to the eastward of all Kambála hill, which is the northern extreme of Malabar hill, until the large rock, called Gull island, in the channel leading to the entrance of Penn river, is about half a point or twice its breadth open to the southward of the low woody south point of Caranjá near the Great hill; or until the south brow of this hill bear E. by N.; you are then to the northward of the extremity of Thull reef. With Gull island very little open, or touching the low woody south point of Caranjá, when the lighthouse bears N. $\frac{1}{2}$ W., or is a little shut in with the eastern part of Malabar hill, you are on the northern point of the foul ground, where $4\frac{1}{2}$ fathoms, rocky bottom, is the least water at low spring tides.

There is no danger in the fair season by borrowing a little upon this point of the foul ground; from 4 to 5 fathoms, hard ground, being the smallest depths at low water; but do not shut Gull Island far in upon the low woody south point of Caranjá. Several ships have passed through the gaps or channels inside the rocky patches in the fair season without knowing it, and there is depth at half tide on them sufficient for a ship

when the sea is smooth ; but, in the S.W. monsoon, the high sea that rolls in towards Thull seems sometimes ready to break on the outermost rocky patches of the foul ground.

SOUTH-WEST PRONG, the extremity of the reef off Colába lighthouse, forms the northern boundary of the entrance into the harbour, Thull shoal being the southern, and the breadth of the intervening fair channel is about 2 miles. From the extreme point of foul ground of the South-west Prong the lighthouse bears N.E. ½ N. nearly 2½ miles, nearly half of which distance is dry at lowest water of spring tides. Malabar point bears from the South-west prong N. ½ E. 4½ miles.

The South-west Prong consists of sharp rocks ; and, being steep, the soundings give no warning near it. At low water spring tides the rocks appear above the surface to a considerable distance from the lighthouse ; and, when the sea runs high in the S.W. monsoon, heavy breakers appear far out upon the Prong at low water, but not to its extreme point.

For rounding this Prong, and entering the harbour, a good mark in clear weather is, Funnel hill kept just open, or touching the north brow, of Caranjá Great hill ; or that part of the hill E. ¾ N. until the Oyster rock is brought on with the flagstaff of Bombay castle, or the whole of Butcher's island seen to the right of the Inner light-vessel, which marks lead clear of the South-east prongs till the latter vessel is reached. Steer then well to the eastward, to pass clear of the Inner light-vessel by the Sunken Rock shoal, by bringing Mazagon house or hill just open to the eastward of the north-east bastion of Bombay castle. This mark continued will carry a ship clear to the eastward of the Sunken Rock shoal and of the Dolphin reef, and to the westward of the Middle Ground shoal, among the shipping in the harbour.

When Funnel hill is not seen, Thull Knob on with the northernmost of the two Paps is a safe but close mark in passing the extreme point of the Prong. Do not bring the Knob of Thull to the southward of this northern Pap ; for, if brought between the Paps, you will pass over the extreme point of the Prong, where a large ship may strike on the rocks at low water, if there is any swell.

The extremity of the South-west Prong is steep-to, and the soundings near it are no guide ; but to the northward of the Prong, when the Peak of Elephanta is seen to the left of the lighthouse, the depth decreases gradually from seaward to the edge of the hard ground that projects from the rocky ledges of Back bay to seaward.

South-east Prong.—When the lighthouse bears N.N.E., there is a gap or basin in the reef, with soft bottom, and the same depths of water as in the channel. This gap separates the outer part of the reef, or South-west Prong from the eastern part, generally called the South-east Prong,

which commences when the lighthouse bears about N. by E. ½ E., extending in a N.E. direction to the Sunken Rock Shoal. This part of the reef is also rocky, with some small gaps of soft ground ; and deep water on its outer edge, when the lighthouse bears from N. ½ W. to N. by E. There are several small holes, or places of soft ground and deep water, well in upon the reef ; but there is shoaler water, less than 2 and 3 fathoms, with rocky bottom, much farther out, towards its exterior edge, when the lighthouse is in line with the signal flagstaff on Kambála hill.

The soundings near the South-east Prong, like those close to the South-west Prong, are soft mud, but are no guide in the approach toward it ; the depths being nearly the same in mid-channel as close to the reefs, or not more than half a fathom different : there is rather less depth near the edge of the foul ground off Thull, than towards the reef off Colába.

Having so far entered the harbour as to have the lighthouse N. by W., the reef projecting round Colába is not so steep and dangerous as it is farther out ; for the hard rocky bottom is then more even, and a ship not drawing much water might venture to get a hard cast on it, when the lighthouse is more westerly than N. ½ W. and the tide flowing fast ; but, if near low water, with any swell, it would be imprudent to borrow on the edge of the reef in any part.

Sunken Rock Shoal is nearly half a mile in length east and west, and nearly 2 cables' lengths in breadth at the widest part, consisting of hard uneven ground, and has 2 and 3 fathoms on it at low water springs. On the eastern edge there is a large rock, on which the sea sometimes breaks, when near low water in the S.W. monsoon, and the seaweed on the top of the rock is visible sometimes when the tide is very low on the springs. A buoy is in general placed near it on the outside, and a light-vessel moored 2 cables' lengths to the southward of the rock ; this vessel bears from the lighthouse E.S.E. 1⅜ miles. From this outer rock the shoal has been called the Sunken Rock, though it is properly a considerable shoal, having another rocky place of 1½ and 2 fathoms, at low water, on the inner part of it, about half a mile from the former. Between them the depths on the shoal are 2, 3, 3½ fathoms at low water, generally hard ground ; and the inner part of this shoal joins to the upper end of the reef projecting from Colába, which makes the passage inside the Sunken Rock shoal unsafe, except for small vessels.

Malabar point flagstaff on with Oyster Rock beacon, leads well clear to the northward, or above the Sunken Rock shoal. Malabar point open to the southward of the southernmost grove of brab palm trees on Colába, leads clear to the southward of the Sunken Rock shoal. Mazagon hill all open with the outer bastion of the castle, leads clear to the eastward of this shoal.

Dolphin Reef, on which a little lighthouse is now erected, is a rocky shoal projecting from Broughton grove, a large plantation of brab trees on Chota Colába; on the inner part of this reef, near the shore, the rocks at low water springs are dry. The Dolphin has a *fixed* green light, elevated 20 feet above high water, and visible 2 or 3 miles in clear weather within the harbour. There is a depth of 4 fathoms, at low water, half a cable's length eastward of this light.

Apollo, or **Polwa Spit,** projecting from the dockyard to a considerable distance, is hard and stony; ships moor clear of it, to prevent grounding, or rubbing their cables. When on the outer point of this spit, where there is a depth of only 9 feet at low-water springs, the Colába lighthouse is in line with the tip of Jamsetji's bunder, and the cathedral is just over the northern end of the dockyard breakwater.

Middle Ground Shoal is steep all round; on the south-east side it is a steep wall of rocks, the sea breaking on it at low water spring tides, when blowing hard; there being only 3 and 4 feet on the shoalest places at these times. At its north end there is a black buoy, and at its south end a black-and-white buoy.

Súri fort just touching the west point of Cross island, leads clear inside or to the westward of the Middle Ground. The Oblong Woody hill (close to the northward of Parell hill) a little more than half shut in with the west end of Cross island, leads clear to the eastward, or outside the Middle Ground; or another mark to pass outside of it is, Cross island open twice its breadth to left of Súri fort. When clear to the northward of this shoal, the Scotch kirk steeple is on with Malabar point flagstaff. And Malabar point flagstaff on with Cooperage tree, leads clear of it to the southward: another mark for being to the southward of this shoal is, Marine office flagstaff on with Scotch kirk.

Flagstaff Shoal, which has a red buoy on it, consists of rocky bottom, the depths on its shoalest parts being about 12 feet at low water spring tides. Between this and the two last-mentioned shoals is the space where the ships generally moor, abreast the town, in 4 or 5 fathoms, low water, soft mud.

The old church or cathedral steeple and castle flagstaff in one, and the left side of the Oyster Rock battery touching the right side of the Dolphin beacon, is on the centre of Flagstaff shoal; but when all the Oyster rock is seen to the left of the Dolphin beacon, you are clear of it on the outside. When clear to the northward of it, the cathedral steeple is a little open to the southward of the single brab tree on the castle; and when to the southward of it, the flagstaff on the castle is a little more than half-way from the steeple toward the single brab tree.

Caranjá Shoal is an extensive bank, on the eastern side of the harbour, projecting 2 or 3 miles from Caranjá island to the westward. The south-western edge of it bears from Thull Knob about N.N.W., and from the south brow of Caranjá Great hill about West, and is nearly two miles to the north-west of Gull island. The westernmost point of the shoal lies midway between Gull island and the Sunken rock, and bears S.E. by E. from the lighthouse, distant 3 miles.

The north part of this shoal, opposite to the Little Caranjá hill, is steep and rocky in some places ; one patch, with only 6 feet water, lies near its edge, exactly half-way between that hill and the dockyard. The south-east point of Tromba high-land open with the north-west end of Butcher island—or, Tromba old church to the left of the tower on Butcher island—leads clear to the westward of the edge of this shoal.

On the southern edge of the shoal, which is more even and not so steep, abreast the Great hill, a ship may in fine weather borrow, to have a hard or shoal cast in working, when certain of not missing stays ; but should tack on getting the first cast of hard soundings, particularly in a large ship, and near low water, for patches of 10, 11, and 12 feet lie not far within the outer edge of the shoal.

On the south of Caranjá shoal is a gap of deep water, between it and Thull shoal, into which gap a vessel may work, if beating into the harbour with a north-east wind. Thull Knob in one with the Paps, clears to north of Thull shoal, and a ship may stand to eastward, till Gull island touches the low south-east point of Great Caranjá ; taking care not to let the western hills of Hog island disappear behind Little Caranjá hill, or Malabar point flagstaff come on with, or be seen to the right of, the Inner light-vessel.

To those acquainted with the distant hills to north-east of Panwel, the best mark, to prevent a vessel working too far into the gap between Thull and Caranjá shoals, is, not to bring Chanderi peak (a little sharp peak close to the left of a flat-topped one) quite to touch the north brow of Great Caranjá, taking care, as above, not to let the Inner light-vessel come on with Malabar point flagstaff. Northward of the Caranjá shoal, there is a patch on which is a rock dry at low water, bearing South $1\frac{3}{4}$ miles from Butcher's island. Between this shoal which is marked by a black buoy, and the rocks off that island which are marked by a white buoy, there is a deep channel with 5 to 8 fathoms.

TIDES.—By the Outer floating light it is high water, full and change, at 12 h. ; but at the Dockhead, and where ships moor, at 11 h. 15 m. ; extraordinary springs rise 18 feet, ordinary 15 to 16 feet ; neaps 9 feet.

In December and January, when the sun is near the southern tropic, there is on the springs nearly 2 feet more rise of tide in the night than in the day ; but in June and July, when the sun has great north declination,

the day tides are highest. In the foul weather season, ships are, therefore, moved in and out of dock with daylight; but ships drawing much water must, in the N.E. monsoon, be transported in and out of dock on the night tides. This phenomenon of the inequality of night and day tides in the different seasons is also experienced on the Katiawar, Sindh, and Gwadel coasts, at Calcutta, and apparently on the south coast of China, and in many places of the eastern seas.

Anchorage.—It is requisite for every person, sailing in or out of Bombay harbour, to remember that the tides rise and fall from 14 to 18 feet on the springs, and 9 or 10 feet at the quadratures. Except upon the reefs or shoals, the bottom is proper for anchorage throughout the harbour, being soft mud or clay. The velocity of strong spring tides between Thull shoal and the Prongs is $2\frac{1}{2}$ or 3 miles per hour; abreast the shipping outside the Middle Ground shoal nearly the same, but not so strong where they moor. In the entrance of the harbour the tide does not set fair through the channel, but the flood stream slants over the extremity of the foul ground of Thull to the eastward, towards the opening leading past Gull island to Penn river. And, during the rains in the S.W. monsoon, the ebb sets strong out of that river to the westward, which greatly assists ships in working out of the harbour; but it is only on the springs that the outsets from the river are strong. The man-of-war anchorage lies between the castle flagstaff and the inner light-vessel, and is all marked out by buoys.

DIRECTIONS for running into the HARBOUR.—To refer to all the marks for avoiding the shoals, previously given in describing them, may often be difficult when ships are running speedily into the harbour with a strong wind and flood tide; the following directions may be readily comprehended to guide the navigator, as the pilots cannot always reach a ship in the S.W. monsoon until she has well entered the harbour.

If a ship in working out meet with severe weather, split her sails, or sustain any accident in the night, so as to force her to return; or if approaching the harbour from sea, with a fair wind for running into it, during the S.W. monsoon; it will be prudent, if the island of Kundári is seen, and not the lights, to keep it well to the south-eastward until one of the latter is visible. If the wind is southerly, do not bring Kundári to the southward of S. by E.; if westerly, or baffling, with a swell rolling in towards Thull, do not bring it to the southward of at most S.S.E. until the outer light is seen; or, on shoaling, haul to the north-north-westward, as Kundári flat extends far out to seaward, and joins also to the south-west part of the foul ground off Thull. In standing towards this flat the depth decreases gradually, and increases in standing from it about N.N.W. toward the South-west Prong.

The revolving light is brilliant and seen far off, sometimes 17 miles from a ship's deck; but, during rain, a vessel may sight the Outer light first, and when close upon it, and then from it should steer N.E. towards the Inner light; after reaching which, if no pilot has come off, the ship should be anchored in 5 or 5½ fathoms, at low water, about a mile to the N.E. by N. of the Inner light. Due allowance must be made for the effect of a flood tide and heavy swell. When the lights are seen let them be the principal guide.

When Light Vessels are not in their place.—If the Outer light were to break adrift, its lamp would of course be extinguished, in which case the following directions may be attended to:—

Should the wind be far to the westward, or baffling, with a heavy swell rolling in upon Thull, run into the entrance of the harbour, keeping the revolving light N.N.E. to N.N.E. ½ E., until the South-west Prong is judged to be near; then edge away to the eastward. The lighthouse N.N.E. ½ E. leads a ship within the extreme point of the South-west Prong; when bearing N.N.E. it is on with the large gap of the reef between the Prongs. If the wind prevail brisk at south-west, bring the revolving light N. by E., or N. by E. ½ E., and run in with these bearings, which will carry a ship fairly into the entrance of the harbour, about mid-channel between the extremity of the South-west Prong and the edge of Thull reef. When thus far advanced the Inner light will surely be seen, and may be steered for as above.

The Inner light is not so likely to be out of place, but the following directions are given in case of such an event. When advanced to the mid-channel between the Prongs and Thull shoal, if the night is not very dark, Caranjá Great hill will be seen, known by its bold and even shape, and by the bearing. When its south brow bears E. by N. ½ N., it is in one with the northern extremity of the foul ground off Thull, where the smallest depth is 5 fathoms at low water with this bearing. When the south brow of this hill bears E. by N., you are to the northward of all Thull foul ground, and ought to edge over to the eastward to give a berth to the South-east Prong and the Sunken Rock shoals.

When running in with the revolving light N. by E. to N.N.E., if the night is dark, and the Outer light-vessel not in its place, and Caranjá Great hill not discernible, it may be difficult to know when you are to the northward of Thull foul ground, and approaching the southern edges of the Prongs; in this case much attention is requisite, as it must depend on judgment. The northern part of Thull foul ground, where there is any danger, is distant from the lighthouse upwards of 4 miles; whereas the edges of the Prongs are only 2 and 2¼ miles from it, when it bears N. by E. or N. by E. ½ E.; the light may therefore be useful as a guide, by attending

to its brilliancy and appearance, to judge from what side of the channel it is seen.

The south brow of Caranjá Great hill is in one with the outer edge of the Prongs when bearing E. ¼ S., and as it bears E. by N. ½ N. from the northern extreme of Thull foul ground, this narrow part of the channel is comprehended between these bearings.

Running in under easy sail, with the Revolving light bearing N. by E. to N.N.E., if Caranjá Great hill is not discernible, and you judge yourself to be to the northward of Thull shoal, and approaching the south part of the Prongs, by the appearance of the light or otherwise, edge immediately well over to the eastward, until it is brought to bear N. by W., or N.N.W.; you will then be above the Prongs and most dangerous parts of the reef. Should you be deceived in estimating the distance from the light, and have a hard cast on the edge of the reef, with the light N. by E. or N. by E. ½ E., haul out instantly to the south-eastward; it being steep-to, with deep gaps from 6½ fathoms, soft, to 3¾ or 4 fathoms, rocky ground, at low water, with these bearings. On the other hand, should you have edged to the eastward before being clear to the northward of Thull shoal, and get hard or irregular soundings on it, haul to the north-westward a little, till in the fair channel.

The line of 5 fathoms soundings, at low water, runs pretty straight to South-west from the Thull shoal till 5 miles North-west of Kundári, where the shoal mud flat is most projecting, and from whence the lighthouse bears about N.N.E. ¼ E. If then running in with the lighthouse N.N.E., the vessel will cross the flat and then increase her water by 2 fathoms gradually towards the Prongs, within half a mile of which the deepest water is.

Having passed inside of Thull reef and the Prongs, as directed, and the revolving light bearing N. by W., you are then fairly entered into the harbour, and may steer N.E. to N.E. by N. on flood tide, or N.E. on the ebb, until the Revolving light bears W.N.W., when a vessel may haul directly to the northward, and anchor, with the Revolving light any way between West and W.S.W., and the body of the shipping at anchor bearing North, which are fair bearings, betwixt the Sunken Rock and Middle Ground shoals; about three-quarters of a mile to north-east of the former. If the night is dark, to prevent running too close to the Oyster rock, or too near the Middle Ground shoal, anchor with the Revolving light bearing from West to W. by S.

If a ship, in edging to the eastward to give a wide berth to the Sunken Rock shoal, get so far over as to have a shoal or hard cast on the edge of Caranjá shoal, there is no danger if she haul directly off to regain the fair channel in the western side of the harbour, for this shoal

is not here so steep as it is farther up abreast of Caranjá Little hill, opposite to the town of Bombay. With the wind at West or W. by N., it will not be prudent to make free with the eastern side of the harbour, either towards Thull reef, or Caranjá shoal.

DIRECTIONS for working into the HARBOUR, during the night in clear weather. When the sky is clear in the night, during the fair weather season, when the wind hangs between North and East, persons a little acquainted with it may, to save time, work into the harbour with the land wind and flood tide, after Kundári and the lights are discerned. Work towards the entrance of the harbour, traversing with the Revolving light when seen from N. by E. to N.E., until you are to northward of the Outer light-vessel, or the south brow of Caranjá Great hill bear E. by N. : being then above the extremity of Thull reef, long tacks to the eastward may be made with safety, towards the south end of Caranjá shoal. Gull island may be approached as near as $1\frac{1}{2}$ miles, when bearing between E.N.E. and E.S.E., which will be a depth of about 5 fathoms, at half-flood.

When the south brow of Caranjá Great hill bears to the northward of East, you are to the southward of the south-west rocky patches of Caranjá shoal ; and, in standing to eastward towards that hill, be careful not to let the Inner light and Revolving light approach each other within one point. When the South brow bears East, you are on the parallel leading close to the outer edges of the Prongs, and, in tacking from the north side of the channel, ought to keep the Inner light-vessel to the northward of N.E. $\frac{1}{2}$ N. With the Revolving light bearing from N.N.W. to N.W. the edge of the reef is not so dangerous, nor so steep, as farther out near the Prongs ; and a ship, with these bearings, if not going fast through the water, nor drawing above 18 or 19 feet, might venture to get a hard cast on it, when the tide is more than half-flood. Otherwise this is not advisable, for some ships, even in daylight, by borrowing too close, have struck on this part of the reef near low water.

In standing from the Prongs towards the middle of Caranjá shoal, the soundings will be a good guide as they decrease gradually. When Great Caranjá south brow bears to southward of East, tack on shoaling to 5 fathoms at low water, or 7 fathoms towards high water. But with Little Caranjá peak bearing East or to southward of East, the soundings will not be such a guide, so a vessel must take care not to go near the north-west extreme of Caranjá shoals, where there is a sunken rock under 6 feet of water, only 3 cables from depths of 6 and 7 fathoms at low water. And it must be remarked that, hereabouts, the east side of the harbour is deepest, and that it shoals gradually towards the Middle Ground ; whereas,

southward of the Inner light, the west side of the harbour by the Prongs is deepest, and thence it shoals over towards Caranjá.

Generally the ships are moored inside the Middle Ground shoal; but this is not always the case, as some ships, when the harbour is crowded, moor to the northward, in the stream of that shoal. It would be imprudent for a stranger to pass within the Middle Ground shoal to the shipping, when no marks are discerned in the night, to lead him round the outside and north end of it; he ought therefore to anchor before the Revolving light is brought to bear W.S.W.; or, if needful, this may be done farther out, between the Sunken Rock shoal and the entrance of the harbour, where the sea is broken by the reef projecting from Lighthouse point; but farther up, above the Sunken Rock shoal, it is more smooth.

When the wind is northerly, ships generally work up between Caranjá shoal and the Middle Ground shoal, then pass round the north end of the latter in proceeding to their moorings; this is the most convenient method with a northerly wind and flood tide. The channel outside the Middle Ground shoal, between it and the north part of Caranjá shoal, is about 1½ miles broad.

DIRECTIONS for working out of the HARBOUR.—During the S.W. monsoon, the spring tides are favourable for working out of Bombay harbour; as the freshets, produced by the rains, then set strong out of Penn river, directly between Thull reef and the South-west Prong, to the westward, greatly assisting a ship in working out; whereas the ebb tide is weak on the neaps, with baffling light winds intervening between the squalls, and a heavy sea rolling in, which frequently prevent ships from getting an offing. Some ships have worked out on the neap tides to 18 fathoms, and were driven with a heavy swell, during light baffling winds, back again into the harbour.

A large ship, proceeding to sea, should have her main top-gallant-mast up, with the sail ready for setting, for it will be found very useful in assisting her to obtain an offing, when intervals of light breezes are frequent between the squalls; and all ships sailing from this harbour, from the middle of May to September, ought to have strong sails bent.

In working out of the harbour in June and July, or in blowing unsettled weather, be sure to keep the entrance open, when the pilots leave you, by working with the revolving light, or lighthouse whilst visible, bearing from N. ½ E. to N.N.E. ½ E.; the entrance of the harbour will then be retained open, into which the flood tide and swell will drive you, if there is little wind, and prevent you from being drifted to the northward of it, or from being necessitated to anchor outside. This can never be done in

the S.W. monsoon, without the risk of losing the anchor, and probably greater loss may be sustained. When outside of Thull reef, the water will deepen in standing to the north-westward near the South-west Prong, and will shoal in standing to the southward, if you approach the flat off Kundári island.

In June and great part of July, as the squalls come mostly from west-south-westward, a ship should work to the southward of the entrance of the harbour with the ebb; the following flood will not be there so strongly felt as near the reef, and a considerable stretch may be made to seaward, if the wind will admit, taking care not to get to the northward of South-west Prong, by keeping the lighthouse to the northward of N.E. by N. If bound to the southward, after getting into 20 or 22 fathoms water, you may continue to stand along the coast, if the depth does not decrease, observing to make a stretch to the north-westward, at times, when the wind is favourable, until you get into 35 or 40 fathoms; you may then safely proceed to the southward, occasionally sounding, to be certain that the depth does not decrease.

In August it is seldom difficult to get an offing, for the squalls draw to the northward of West, and the freshes usually set strong out of the rivers, enabling ships at times to stand from the harbour direct to the southward without tacking; this has also happened in June and July, although seldom. In August it is not so dangerous to get to the northward of the South-west Prong, although still advisable to keep the entrance of the harbour open. In this month, when bound to the southward, you need not be particular to obtain a great offing in the parallel of Kundári island; but, after rounding that island, you may stand along the coast, if the wind permit you to increase the depth of water; otherwise a tack at times must be made until it is increased to 30 or 35 fathoms.

CHAPTER VI.

GULF OF CAMBAY.—COASTS OF NORTH KONKAN, SURAT, AND BROACH.—PART OF GÚZERÁT.

BOMBAY TO CAMBAY.

Mean Variation, 0° 25′ East in 1865.

The eastern side of the Cambay Gulf comprises the coast of North Konkan, the little Portuguese settlement of Damáon, the coasts of Surat and Broach, and part of Gúzerát.

The COAST.—North Konkan, which has, as before explained, its southern limit at Choul, is on the north separated from the Surat collectorate by the settlement of Damáon. This coast in the vicinity of, and above Bombay for 90 miles, has remarkable peaks and islands, which unmistakeably point it out. The Surat and Broach coasts, with the exception of a few hills to the north of Damáon, have no distinguishing features, and the sea shore is low and sandy, with cocoa-nut trees.

The coast of Gúzerát, comprising the head of the Cambay Gulf, is all low and swampy. Gúzerát is a very large province which comprehends the whole dominions of the Gaikwa of Baróda, and those of his tributaries, which have an area of 41,536 square miles. This includes the peninsula of Katiawár, which will be described in the next chapter.

The *mainland* of Gúzerát, as contra-distinguished from the *peninsula*, has some considerable rivers, which intersect or skirt the country; these will be described in their place.

GENERAL DIRECTIONS.—A ship, bound from Bombay to the northward, should leave the harbour towards the latter part of the ebb, that she may get to the westward of the reefs off Bombay by the time the flood makes, which will then be with her in proceeding to the northward. She should keep Kundári island clear to seaward of the Outer light ship, so long as in sight from aloft, to avoid the Prongs, and the rocky ground off Malabar point. The coast from Bombay to Tarapúr may be approached by a large ship into 8 fathoms in fine weather, and in some parts into 6 or 7 fathoms; the bottom is frequently rocky between Tarapúr and Damáon. The foul ground of Sunján, off Dánu, extends a great way out, and should not be

approached nearer than 12 or 13 fathoms, for within these depths there are overfalls in some places, the bottom rocky, and unfit for anchorage.

When abreast of Damáon, and from thence to Surat (except off Bulsár, where there is a patch of 20 feet in 5 or 6 fathoms water), the coast may be approached to 5 or 6 fathoms, at low water; but, in standing to the westward, a ship ought not to deepen above 19 or 20 fathoms towards the Malaiki banks. When within 10 miles of Surat road, it is proper to keep in 8, 9, and 10 fathoms, taking care not to stand off above 5 or 6 miles.

With a contrary wind, ships working between Bombay and Surat, to benefit by the tide, must not stand far from the coast, but work within 10 or 12 miles of it. They will be obliged to anchor when the tide is against them, except on the neaps. A ship that sails well may sometimes hold her own, by stretching well out in the offing, and taking advantage of any favourable slants of wind which may happen.

MALABAR POINT, or Walkeshwur, which is 3 miles N.N.W. of Bombay lighthouse, is high, and a conspicuous mark to a vessel coming from the northward. Its highest part, more than a mile north-east of the flagstaff, has houses and brab trees, which are visible more than 15 miles in clear weather.

MÉHIM BAY, at the south extremity of the island of Salsette, is formed by Worli point (the north-west point of Bombay island) on the south, and Bándra point on the north, the latter bearing N. by E. 6 miles from Malabar point. Bándra church, near the summit of the point, is 120 feet above the sea. Since the construction of Méhim and Sion causeways, the bay of Méhim is much filled up, and is now only a refuge for fishing boats. Small coasters find scanty shelter from north-westers under Bándra point, but no ships should shoal under 5 fathoms by day, and 7 by night, in working up this coast; and let it be remembered that the rise of tide at springs averages $2\frac{1}{2}$ fathoms, the least rise of neaps being $1\frac{1}{2}$ fathoms.

The Neat's Tongue, or high land of Tromba, is 6 miles eastward of Méhim bay. The high land of Salsette, on the large island of that name, which is north of Tromba and extends 16 miles to the northward of Méhim, has several remarkable peaks; the central and highest, called Tannah peak, being 1,530 feet high, a flat-topped hill when viewed from the westward, and standing 9 miles south-east from the entrance of Basseen river, which flows round the north and east sides of Salsette island to Tannah town, and has considerable depth at high water. The northern high peak of Salsette is a detached sharp peak, also 1,500 feet above the sea. When viewed from the south-west, these high peaks of Salsette are closed together, so as to have the appearance of one central summit. The sea-face of Salsette island is fronted by several islands, large and small; the

northernmost, called Derávi, which is the largest in superficial extent, and the highest, being 7 miles in length, north and south.

VERSOVAH FORT, at the south extreme of the island of that name, is about 12 miles due North of Malabar point; a vessel, coasting between them, should not come under 6 or 7 fathoms, for under 5 fathoms the bottom is rocky; the coast generally is low, but the high land of Salsette in the background is 9 miles distant from the fort, bearing N.E. by E. What used to be called Versovah river is simply a passage between two islands into an extensive backwater, without any bar, having $2\frac{3}{4}$ and 3 fathoms in the entrance; the channel is close to the fort, and at this place not above 150 yards wide, being contracted by the shoal which stretches from the village along the eastern shore, and which extends nearly to the point, at the west side of the entrance, on which the fort is situated.

Off this place there are several rocky patches; that called Versovah rock lies one mile to the westward of the point, and has 5 fathoms close to it at low water, and $3\frac{1}{2}$ fathoms inside, between it and another rock, which is always above water. Inside of this rock lies Ambú island, which is small, with a little building on it, and joined to the point by a reef of rocks dry at half tide. There is another shoal of rocks, about a mile S.W. from the fort, having only 2 feet on it at low water; between which, and the island and other rocks to the northward, is the channel leading to Versovah town.

Between Versovah and Derávi islands there is a small channel, formerly called the river Murwa, which is navigated only by boats. A little hill, 90 feet high, at the south end of Derávi island, marks the north side of Murwa bay. There is a rocky patch of $3\frac{1}{2}$ fathoms at the distance of $2\frac{1}{2}$ miles to the westward of Murwa bay.

TIDES.—High water here at 12h. on full and change of moon; the rise of tide 16 feet at ordinary springs, and 10 at neaps.

DERÁVI ISLAND, between Murwa and Basseen, has a fort on its north end, which is 10 miles North of Versovah fort. The northern part of Derávi island is highest, attaining, at the distance of half a mile from the fort, an elevation of 300 feet, and from thence it slopes to the southward; several Portuguese churches stand on the hills.

BASSEEN RIVER, $10\frac{1}{2}$ miles north of Versovah, has shoal water extending a great way out; the coast between these places is rocky under 5 fathoms, and should not be closely approached, as some of the rocks lie a mile from the shore. Although at high water large vessels might enter Basseen river, it is only used by coasting vessels now.

Basseen town, now a decayed place, but once of importance to the Portuguese, is situated on an island separated by a narrow channel from

the main land of the North Konkan. This island of Basseen is about 10 miles in length from south-east to north-west, and 3 in breadth. It has an irregular surface, with some hills of considerable elevation; one a very high hill of table form, and, south of that, stands the conical hill, called Basseen peak.

Basseen Peak, or Kamundroog, 10 miles E.N.E. of the river entrance, is 2,160 feet above the sea, with a great level piece of land of equal height to the north of it. These hills, with the high land of Salsette, and the Neat's Tongue, will unmistakeably show when a vessel is to the north of Bombay.

The fishing stakes are placed a great way out, and ought to be avoided in the night by vessels working along shore. Both to the northward and southward of Bombay, off Méhim, Versovah, Basseen, Choul, they are sometimes placed as far out as 8 or 9 fathoms water; they are laid down by the fishermen at the beginning of the fair season, and taken up before the S.W. monsoon sets in. This is done by pressure, as they are forced into the ground on the falling tide, by boats affixed to them; and dragged out of it in the same manner with the flood. Each stake is valued at 50 or 60 rupees; therefore persons should be careful not to destroy the labour of these industrious fishermen.

Pos Pir, a little rock, on which is a *Mahomedan saint's tomb, lies* at the north side of Basseen river entrance, one mile from shore, and $2\frac{1}{2}$ miles to the north-west of Derávi fort. To the north-west of Pos Pir a reef extends from it nearly 2 miles.

To enter Basseen River.—Before coming into 5 fathoms, bring the south steeple of Basseen on with Beundi hill, the first little peak to the south-east of the great Basseen peak, or that steeple E. $\frac{1}{2}$ S., then stand in direct for Pos Pir rock; when near this, edge away round the southern side of it until it bear North or N. by W., then steer over direct for Derávi battery on the starboard shore. If to proceed to the town of Basseen, which is a little way up the river, after passing to the southward of Pos Pir rock, keep close along the northern shore till abreast the fort; for the centre of the river is occupied by an extensive bank nearly dry at low water, and to the westward of Derávi battery a reef of rocks projects nearly to the meridian of Pos Pir rock. To the southward of this rock there is a patch of shallow muddy ground, which divides the bar into two parts; the least depth on it at low water spring tides is 1 and $1\frac{1}{2}$ fathoms, the rise about 17 feet, and the tide flows to $12\frac{1}{2}$ hours, on full and change of moon.

Recent charts, not considered correct, show a clear passage into Basseen river, quite different from the above, by steering straight in for Derávi fort wher bearing E. $\frac{1}{2}$ N. and rounding it as close as convenient; they show

also that the bank, which was in the centre, is now attached to the northern shore.

ARNOL ISLAND, which is nearly a mile distant from the main, and bears from Pos Pir N. by W. ½ W., distant 7½ miles, has a little fort on it.

Between Basseen and Arnol island the distance is about 9 miles; the shore is rocky, and should not be approached under 8 fathoms by a large vessel. The high land of Basseen, and its separate peak, are conspicuous landmarks; but the part that fronts the sea and on which Basseen town stands is very low and marshy, forming at high water an island, as it is cut off by a creek from Basseen river to Vaturna river. Out of this low land stands up the old fort of Wujirgurh on a little hill, which is 4 miles north of Derávi fort, and rather conspicuous in hazy weather.

Between Basseen and Kalapúra, a town on the main low land abreast of Arnol island, the coast is very low, though the mountains to the eastward are so high.

There is only a narrow channel between Arnol and the main: the island is surrounded by rocks. To the north of it is Angasi bay, a deep bight, the mouth of the Vaturna river, but this is full of shoals, and only navigable by boats or small vessels towards high water. The channel into the river is between Arnol and the main, for a reef of rocks extends right across the mouth of Angasi bay.

USSAPÚR ROCK is high, detached from the mainland at high water, and forms the north extreme of Angasi bay, being 4 miles to the north of Arnol island. At low water the rocks dry to a distance of half a mile outside of it, and extend thus far out, right across the bay, to Arnol island.

KILWÁ MÉHIM is a village on a little creek 3½ miles to northward of Ussapúr, having a little detached rock fort outside. Méhim is a town 2½ miles farther north. Off this part of the coast the rocks are very extensive, one patch of 3 fathoms lying 4 miles west of the latter town; and the coast reef, that partly dries at low water, extends off shore more than half that distance. Sirigom, a village midway between Ussapúr rock and Tarapúr point, has an old Portuguese fort; and Sátputti-kári, a small creek, lies 2 miles northward of it.

The COAST between Arnol island and Dánu is low, and much overflowed by high spring tides; but, at an average distance of 7 miles from the sea, there stands the high land of Tarapúr and Méhim, a fine chain of hills, in parts wooded, in parts barren, with several conspicuous summits.

This low coast is thickly fronted with brab and date trees, both which are cultivated for toddy; the date tree produces fruit, but of inferior size and quality. The soil throughout is very poor, and unfit for the cultivation of anything but rice, of which a single crop only is produced during the year.

The whole coast, being fronted by a dry rocky reef, is without a single harbour or anchorage for any but the small coasting craft.

The coast fronting the sea between Basseen and Tarapúr is generally low and covered with trees. Between Bombay and Tarapúr the tides set nearly in the direction of the land; the flood a little towards it, or North, and the ebb a little from it, about S. by W.

Tarapúr Point bears N. by W. from Arnol island, distant 22 miles; between them the coast is rocky, and not to be approached nearer than 8 fathoms, for the foul ground projects from that point nearly to that depth. On the north side of it, the town and bay of Tarapúr are situated; there is anchorage for small craft to the north-west of the town, within a rocky barrier reef, but the bottom is mostly rocky, particularly in the southern part of the bay, which is full of rocks and shoals, extending from the point to the north-west and northward, abreast the town. Tarapúr town, on the south side of the creek, has the remains of a Portuguese fort bearing the date of 1593. Chichun town, on the north side of the creek, has a custom house and traveller's bungalow. The sea coast is low and densely wooded.

Wudwan Point is a little low point with mangrove bushes, 6 miles to the north of Tarapúr point. The most dangerous part of the Sunján, or Dánu reef, lies 5 miles to the north-west of Wudwan point.

The hills about this part of the coast commence about 4 miles from the shore; at first small and detached, gradually increasing in size, and becoming more connected to the eastward, and forming, at the distance of 5 miles, a continuous chain of low hills, running parallel with the coast, with much wood on some, whilst others are quite bare.

Káldrug, or the Peak of Tarapúr, situated 12 miles to the S.E. of the town, and a little inland, resembles a castle when seen from the north-westward, being composed of rugged rocks upon the summit of a hill 1,550 feet high; and there is a very sharp pyramid, called Valentine peak, about 15 miles farther to the northward; and about midway between them is Allung hill or Asirí. Both to the north and south of Káldrug there is a remarkable peak at the distance of 4 miles.

Mahaluxmi, or Valentine's peak, 1,540 feet above the sea, is rather a sharp peak, bearing E.N.E. from Tarapúr point, distant 16 or 17 miles.

The High Land of Sunján, commonly called St. John, is to the north-west of Mahaluxmi; its highest part, 1,760 feet above the sea, bears N.E. by N. from Tarapúr point, 17 miles; and from the outermost foul ground off Dánu it bears E.N.E. Sunján high land commences to rise at 3 miles from the sea shore, and has a regular appearance, sloping to the northward and southward from the centre, which is a round mount, and is the part always set for the body of the high land which may be seen in

clear weather 40 miles. It is in lat 20° 4′ N., and on the meridian of Bombay castle.

FOUL GROUND of DÁNU.—An extensive reef, with rocky ground, fronts this part of the coast, projecting from it 7 or 8 miles, abreast the high land, and stretching from Dánu river a little northward of Tarapúr nearly to Damáon, a distance of 28 or 30 miles.

When the body of the high land of Sunján is brought to bear E.N.E., a ship is then approaching the southern part of the foul ground, and ought not to come under 12 or 13 fathoms, for the rocky bottom reaches that depth out in some places. With the body of the high land bearing from E.N.E. to E.S.E. a large vessel ought not to come under 15 fathoms, towards the verge of the foul ground; for she is liable to lose her anchors among the rocks, if drifted on the edge of the reef during a calm, and obliged to anchor where the tide runs strong in eddies. When the body of the high land of Sunján is brought to bear E.S.E., a ship is to the northward of the extremity of the reef, and may stand in to 10 or 11 fathoms before tacking from the shore; but not closer than 10 fathoms till nearly abreast of Damáon, for the coast continues rocky as far out as 8 or 9 fathoms until that place is approached.

When round the foul ground of Sunján, a ship should steer to the north-eastward to get near the coast; in working she may stand in to 10 or 11 fathoms, and off to 18 or 20 fathoms; but, in standing far over to the N.W., if she begin to shoal on the southern part of the Malaiki banks, it will be prudent to tack, and stretch over towards the coast, and then keep within a moderate distance of it in proceeding towards Surat road.

Danu Fort and town are situated on the north side of a little creek 4 miles N.E. by E. of Wudwan point, in a deep bight, which is more than 7 miles from the outer edge of the Dánu reef. Small coasters find anchorage within the reef in 3 or 4 fathoms, between 4 and 5 miles West of Dánu fort. There is a considerable export trade at Dánu in small timber and bamboos. The creek can be entered at high water only, and is convenient for small coasters, having wells of good fresh water close to the bank. Dánu may be distinguished by two thick clumps of trees, one on either side of the creek.

GULÚR POINT, 6½ miles N. ½ W. of Dánu fort, is low, with cocoa-nut trees, having one high tree which marks the point, off which the foul ground extends nearly 4 miles.

OMERGÁM, 8 miles N. by E. ½ E. from Gulúr point, is a little town with a ruined tower, on the south bank of a small creek, and the foul ground extends nearly 4 miles off this part of the coast, which is low and

sandy. The creek of Omergám is the northern boundary of Sunján high land, between which and Damáon are six remarkable hills : the first, near Omergám, is a rather long table hill ; the next is of a roundish form ; the third, known as Slope hill, has a remarkable bush on its southern side ; the fourth, named Pyramid hill, is 560 feet high, and forms in two distinct summits ; the next, the highest of all, being 770 feet above the sea, and thickly wooded, has been called Wooded summit ; and the sixth, and most northern one, having a ruined fort on the top, named Indaghúr, is 405 feet high, overlooking on the north side the little creek of Kauli, which is the southern boundary of the Portuguese possession of Damáon.

Indaghúr is 3 miles S. by E. of Damáon fort, and 17 miles north of Sunján high land. Between Omergám and Damáon the foul ground does not extend 3 miles off the land, which is low, with bushes and with two indentations, where are situated the little creeks of Marúli and Kauli ; the former lying 2 miles W.N.W. of Pyramid hill ; the latter about the same distance and bearing from Indaghúr.

DAMÁON, or Damán, belonging to the Portuguese, is known by two square steeples and the white appearance of the buildings, also by a hill to the northward composed of four hummocks called Damáon hills, on the highest part of which, elevated 420 feet above the sea, is an Idgah, or Mohamedan place for prayer. Rather more than half a mile north of Damáon there are three brab trees close together on the low shore. On either side of the river there is a fort ; and, as stated before, Indaghúr fort on the south side of the river, on a hill three miles distant, is another mark to know this place.

Supplies.—Provisions and vegetables are cheap and plentiful ; it is an excellent place for small vessels to remain during the S.W. monsoon, or to receive repairs if needful, the country being well stocked with ship timber. Many ships from 500 to 900 tons burden have been built in this river. The building of ships has always been a source of profit to this place. Between 1790 and 1818 there were 34 ships built at Damáon ; of which several were of 700 to 900 tons. (See 6th volume of "Asiatic Journal," page 366.)

Damáon has been in the possession of the Portuguese since the year 1531. A few grabs, which class of vessel is now going out of date at Bombay, still belong to this port ; they trade to Mozambique and other African ports.

ANCHORAGE.—Ships may anchor in Damáon road in 6 fathoms low water, with the river open, bearing East ; Parnéra hill N.E. ½ E. ; and Indaghúr E.S.E. ; off the town about 4 miles ; remembering that the rise of tide is 3 fathoms at springs, and nearly 2 fathoms at neaps. The depth

at low water spring tide is 2 feet on the bar, and 18 or 20 feet inside, between the forts at the town, where the bottom is soft mud. The bar is very flat, mostly hard sand, except from the north point of the river, where rocky ground projects a great way out.

TIDES.—There is never less, at common springs, than 3 fathoms at high water on the bar; the rise of tide being 17 or 18 feet; and it flows to about $1\frac{1}{2}$ hours on full and change of moon; but, in the offing, the flood stream continues till $2\frac{3}{4}$ hours.

DIRECTIONS.—Vessels of considerable size, up to 500 tons, sometimes go into this river at high water, in fine weather, and moor abreast the forts. To enter the river, keep the entrance open, bearing East. and steer for it, or keep the first round hill, a separate hill to the north of Indaghúr, nearly in line with the church tower, or between the tower and flagstaff of the southern fort, till the three brab trees are open to the left or north-west of the Idgah hill, when you are on the bar. Then steer direct for the south part of the north fort, which is called St. Jeronimo, and anchor as nearly in mid-channel between the forts as you can.

It is not advisable to attempt running in without a pilot, unless the vessel is in distress, for the channel is extremely narrow, and the sand-banks shift every monsoon. At low water springs there is only a depth of one foot of water on the bar, and that in a very minute channel, merely a thread, so as to be impracticable for ships' boats.

These rivers of the North Konkan, above Bombay, which are described in this chapter, are only frequented by boats and small vessels, and by the shifting of the sands their channels are liable to alter; it may therefore seem of little utility to notice them so particularly; but it may sometimes happen that a storm will overtake a ship on this part of the coast, and force her to run for the nearest river to prevent her being driven and lost on the shore reefs. If running in is attempted, it ought to be near high water, to afford a chance of succeeding.

Damáon river is the safest and most favourable for such purposes. The *Hornby*, of 700 tons burthen, and other smaller ships, were saved by running at the last extremity into this river, when encountered by sudden storms, on departing from Surat road in the month of May.

The Malaiki Banks.—The southern extremity of these banks (fully described at page 158), which choke the entrance of the gulf of Cambay, has 5 to 7 fathoms, *abreast of*, that is to say, in the latitude of Damáon, distant about 26 miles. Another little narrow bank, having 7 fathoms water, and being 7 miles in length north and south, has been found at the distance of 15 miles north-west of Damáon.

NOTICE. — The Government pilot at Damáon gave the following account of a shoal, to the officers surveying that coast in 1854, but their

search proved fruitless. The pilot's statement was to the following effect :—

"Some 17 years ago (*i.e.* about 1837) when piloting a vessel from Goa to Damáon, they were at noon by observation in lat. 20° 15′ North, with Sunján high land bearing E. ½ S., and in 18 or 19 fathoms. They stood to the eastward during the afternoon with a light wind, and about 3 h. p.m. got a cast of 4 fathoms, the previous casts being 12 and 14 ; they immediately went round and had only 2½ fathoms, the tide at this time being half flood."

The fishermen, it is said, frequently strike on the bank, which is of sand, and very small in dimensions. No other bearings of the land are given by which its position may be determined, but the pilot knows they had from 12 to 14 fathoms water inshore of the bank.

The above bank *may* exist at the very southern extreme of the Eastern Malaiki banks.

OMERSÁRI CREEK, or Par nadi, runs into the sea 8 miles N.N.E. of Damáon. This creek is properly the northern boundary of the district of North Konkan. Parnéra hill fort, on its north bank, and 3½ miles within the entrance, is 620 feet above the sea.

Omersári bar is dry at three-quarters ebb : a small vessel bound into this creek should bring a high white building at Balda Pardi town to bear E.S.E., and then steer in with the entrance of the creek open ; when Parnéra hill bears E. by N. she will be inside the bar ; and in the entrance of the river she may anchor when the land to the northward is shut in with the point on the same side.

CAUTION.—To the westward of Omersári, nearly 5 miles off shore, is a shoal patch with less than 2 fathoms ; and another, having little more than 3 fathoms, with 6 fathoms close to it, lies 9 miles to the W.N.W. of Omersári. Between Damáon and the entrance of Surat river the coast forms a deep bight, throughout which the water is very shoal.

BALSÁR RIVER, 6 miles north of Omersári, is nearly dry in the entrance at low water spring tides, the rise being about 18 feet. An extensive flat of mud and sand dries at low water half a mile outside of the river, and only towards high water can vessels get over the bar.

Large vessels must anchor 8 or 9 miles off shore.

A vessel proceeding into this river ought to bring the northernmost tree, or grove of Cosumba, on the south bank, to bear E. by S., in one with the south point of the entrance, and may then steer directly for it with safety. Outside and about half a mile from the bar, there is a rocky bank with 6 feet on it at low water ; the intervening ground has 12 and 14 feet, soft

mud. In the river there is a depth of 7 to 9 feet at low water, and the native vessels generally lie aground in the mud after half ebb.

Rola Hill, having one tall brab tree near the top, is 5 miles to the north-east of Bulsár mouth. A white bungalow, well visible in the afternoon, is situated on the beach at the village of Tithul, between Bulsár and Omersári.

The coast between Omersári and the town of Unklesir, near Tankária, is a part of what is called Alaveesi, or the 28 districts of the Surat collectorate. The sea face is sandy with trees, but inland of that the shore is swampy; there are only 2 or 3 hills, and these are all southward of Gundavi.

TIDES.—It is high water, full and change, at 1 h. 45 m., but the flood stream in Bulsár roads runs one hour later; ordinary springs rise 18 feet; neaps 11 feet.

GUNDAVI RIVER is distant 8 miles N.N.W. from Balsár river, having a bar above a mile from the entrance, with 3 and 4 feet on it at low water. To get into it, bring two palm trees, called Mendhur trees, to bear E.N.E., then steer over the bar, with this bearing, for the shore to the northward of the entrance, passing between the main land and an island composed of small shingle; the flood tide sets rapidly right across the sandy spit projecting northward from the south shore, and care must be taken to avoid the north end of the south sand, on which fishing stakes are sometimes placed. When a flat bush, resembling the top of a barn, is brought to bear S. by E., steer for it, and anchor close within the south point of the river, or outside of the entrance close to the northern shore.

There is a creek called Kúndi kári, 3 miles north of Gundavi river. The great rise of tide along this coast renders nearly all these creeks accessible at high water; but native pilots must be used, as the shifting nature of the banks prohibits any great confidence being placed in old written directions.

TIDES.—High water at 2 hours on full and change of moon; the rise of tide 19 feet at ordinary springs, and 12 at neaps.

NOSÁRI RIVER bears from Gundavi river about N.N.W., distant 11 miles; it is wide at the entrance, but difficult of access, on account of the winding channel among the banks, which has generally 3 or 4 feet in it at low water spring tides. The directions given by Horsburgh for entering this river, will not tally with the more recent survey of its entrance made in 1852.

Bibi Ajáni, a tomb of the Borâhs of Surat, situated 2½ miles to the southward of Nosári river, has a white dome, conspicuous, especially from the south-west, amongst the dark green trees. Between Bibi Ajáni and Surat river is a low dreary plain of sand with cocoa-nut trees.

Between Nosári and Surat rivers there is another called False river.

APPROACHING SURAT from the Southward.—Between Damáon and Surat river the land near the sea is low, covered with trees, and in some places, particularly contiguous to the rivers, it is inundated during high tides in the stormy season.

When round the foul ground of Sunján, and abreast of Damáon, steer along the shore for Surat road, and do not stand farther off than 7 or at most 9 miles from it, nor deepen above 14 or 16 fathoms. In working, stand in to 5 or 6 fathoms on the soft bank lining the shore; but, if anchoring at high water on the edge of this bank, to benefit by the first of the following flood, do not anchor under 7 fathoms at spring tides, because the water sometimes falls 19 or 20 feet. The *Gunjavar*, a large ship drawing 21 feet, bound from China to Surat in the year 1788, having anchored in 6½ fathoms off this part of the coast, grounded in the soft mud at low water.

With Parnéra hill bearing about E. ½ N., the Omersári narrow spit of sand extends a great way out, with different depths on it from 8 to 13 fathoms; this may sometimes be a guide in the night, when passing at 5 or 6 miles from the shore, if the lead is kept going, as the water will shoal suddenly in crossing it, and soon return to the former depth when over the spit. Having passed 10 or 12 miles to the northward of Parnéra hill, a ship should steer along shore, in soundings from 7 to 9 or 10 fathoms; but, in working, if she stand far out and get a cast of hard ground, or shoal on the edge of the Malaiki banks, after passing through the deepest water which has upwards of 20 fathoms only one mile to the eastward of the banks, she should tack instantly towards the land. When within 12 or 15 miles of Surat road, she ought to work from 6½ to 7 fathoms towards the shore, to 10 or 12 fathoms in the offing, as the channel then becomes more contracted; 9 or 10 fathoms is a good track with a fair wind.

SURAT ROAD and RIVER are situated at the narrow part of the entrance of the gulf of Cambay. Tapti light, close to Vaux's tomb on Suáli point, the north entrance point of the river, being situated 12 miles to the N.W. by N. of Nosári river entrance, and 67 miles due North by compass from that outer part of the Sunján or Dánu reef, which nearly dries at low water.

In the latter part of the eighteenth century, Surat stood high as a commercial port, but has faded before the great superiority which Bombay has attained both in a commercial and maritime point of view. The commerce of Surat is now in a great measure confined to the export of cotton for Bombay, and of grain for the supply of the less productive Konkan.

The distance from the bar to the city of Surat is about 18 miles, with the windings; for nearly two-thirds of the distance there is a continued chain of banks, many of them dry at half tide, with very small depths at low water in the channels between them. Above Omrah, and near the city of Surat, the river is more contracted, with deeper water. The total length of the Tapti river, from its source in the Saugor and Nerbudda territories, is 440 miles; and of course in the rainy season the freshets must be very heavy, and interfere with the tides at the mouth of the river. The Tapti can scarcely be called a navigable stream, as, at Surat, it is fordable when the tide is out, but, with the great rise of tide of 3 or 4 fathoms, vessels of considerable size can be taken up to that place.

TAPTI LIGHT is a *fixed* light, on a mast, elevated about 80 feet above mean sea level, and situated a few yards from Vaux's tomb; it is a small light, scarcely visible more than 10 miles, as the atmosphere is mostly hazy on this coast.

Proper directions cannot be given for a stranger to proceed over the bar into Surat river, because the sands are continually changing, by which new channels open, and the old ones are shut up. Formerly that called Domus channel was the deepest, and generally used by ships; it took a direction on the east side of the banks, toward the village Domus on the eastern shore, but it is now filled up, being only navigable by boats at half tide. The proper channel over the bar, at present, is between the sand that projects above 1½ miles from Suáli point, forming the north side of the bar, and other extensive sands which fill the middle of the river, and the eastern shore. After turning round the extremity of Suáli sand, the channel takes a direction to the northward close along the western shore of the river, where it becomes much deeper and more safe than between the sands outside. Although this is the proper channel to enter the river, it is narrow, and at low water spring tides there is not depth sufficient for a small boat between the dry sands near the bar; which sands to those passing outward having a dreary aspect, being elevated 12 or 14 feet on each side of this contracted channel. Boats passing down with the latter part of the ebb in this narrow gut are carried along very speedily by the water rushing through it with great violence; and, it being very shallow, they are liable frequently to touch the bottom, when the Lascars, or sailors acquainted with the river, always leap out to support the boats and prevent them from upsetting.

TIDES.—In Surat roads it is high water, on full and change of moon, about 2 h. 45 m., but the flood stream lasts one full hour longer. The rise at extraordinary springs is 23 feet; at ordinary springs 19 feet; and at neaps 12 or 13 feet. The tide falls frequently more than one fathom before the ebb stream.

With regard to the tides in Surat roads, the surveyors, in the year 1855, remark that, "Either the old navigators exaggerated their velocity, "or it may be owing to the filling up of the gulf of Cambay, but the fact "is, the tides now are not so strong as they were said to be."

ANCHORAGE.—The anchorage ground for large ships in Surat road is in 7 or 8 fathoms at low water, with Vaux's tomb bearing N. ¼ E. to N. ½ E., in a stiff clay bottom, and with Bhimpúr pagoda N.E. by E., and Domus flagstaff N.E. by N. Here on the springs the tides run very rapidly, particularly the ebb about 5 knots per hour to S.S.E.; but farther in, where small vessels lie near the bar, in 4 or 5 fathoms, at low water, with the tomb or Tapti light N. ½ W., they do not run with equal velocity, and they set N. by W. and S. by E.

STORMY WEATHER.—In Surat road, and in the entrance of the gulf of Cambay, southerly winds and blowing weather set in sooner than at Bombay. It is considered dangerous for ships drawing much water to remain in the road after the middle of April; for in this month, and early in May, smart southerly winds frequently blow during the springs, particularly in the night, with the flood tide. These winds produce a considerable sea, which by the strength of the tide strikes forcibly against a ship, causing her to drive and bring both anchors a-head. It is therefore advisable, when a ship is detained in Surat road late in the season, to keep at single anchor, with a good cable down, sighting it at every convenient opportunity; by so doing she will ride better in blowing weather than if two anchors were down; and should circumstances make it necessary to cut or slip, only one anchor will be left on the ground.

At such times it is prudent to keep a pilot on board, that he may carry a vessel, if small, into the river, should a storm be apprehended; or to Gogah, if it seem more eligible; where she will be sheltered by the reef and island of Perim. In some storms that happened late in April and early in May, several ships have been lost by remaining too long at their anchors, when the wind had veered round to the westward and prevented them from weathering Suáli point. In the heavy storm that happened on the 20th of April 1782 several large and small ships were moored in Surat road: some parted their cables, were driven on shore, and went to pieces; others held fast, but rolled away all their masts by the heavy sea; one of them completely laden for Basra, called *Fatty Bimbarack*, rolled away her masts, and foundered, when the wind had veered and was blowing hard from the land; her loss was occasioned by her labouring between the wind, tide, and high cross sea from southward and westward; excepting one Lascar, all the crew of this ship perished. She was a strong vessel with a valuable cargo on board. Since 1782 no such storm has happened in April at Surat, nor even in May, although some gales have been experienced in the latter

month. The approach of a gale in these months is sometimes indicated by dark cloudy weather, gloomy and black to the south-eastward, with lightning, and faint variable breezes, mostly from southward : with these indications, a ship should ride at single anchor in a state of preparation for severe weather, with a good fore-sail and storm stay-sails bent. Some ships lie with top-masts struck, the fore-sail and storm stay-sails being sufficient to run with over the bar or to Gogah.

The MALAIKI BANKS, (commonly called Malacca banks,) although having narrow tongues of shoal water as far south as latitude 20° 20′ N., may yet be said to have no dangers south of a line drawn between Damáon on the Surat coast and Jafrabad on the south-east coast of Katiawár. Their northern limit of danger is defined by a line running east and west, between Tannah creek (above Vaux's tomb) and Goapnáth point. To the north of this line, all the numerous banks have distinctive names of their own. Between Goapnáth point and the Nerbuddah river the gulf has never been thoroughly examined, though the chart shows a patch of 5 fathoms in the very centre.

The western limit of the Malaiki banks lies 30 miles to the S.S.W. of Goapnáth point, on the south-east coast of Katiawár. There are four banks, the Eastern, the Breaker, the Nerbuddah, and the Western ; and, though there are deep channels between them, these become very narrow at their northern mouths, rendering it inexpedient to attempt the passage through them.

Nerbuddah Bank shows a large extent of sand, dry at low water, halfway between Surat road and Mowah harbour in Katiawár.

Breaker Bank has, at the distance of 20 miles S.W. ¼ S. from Tapti light, a knoll of sand, which is seen at high water of neap tides, though submerged at high springs. This sand is in latitude 20° 50′ N., and longitude 72° 23′ E., and from the mast-head may be seen a great distance when the sun shines on it.

The head or northern limit of Malaiki banks should never be approached with an ebbing tide ; being steep-to, the soundings give no sufficient warning, and, were a vessel to take the ground, she would be overset in an instant by the rapidity of the tides. The easternmost danger of these banks is about 5 miles from Surat bar, having 1 and 2 fathoms on it at low water ; Vaux's tomb, or Tapti light, bears from it N.E. The eastern patch of sand, which is dry at low water, is 18 miles west of the entrance of Kundi kári, or distant 13 miles bearing S.W. by S. from Surat roads.

The North-eastern Danger, or head of the banks, is 6 miles west of the little hill which is said (by Fryer, in his "New Account of East "India and Persia," in the end of the 17th century), to be Tom Coryat's

tomb, which is close to the sea, about 5 miles to the north of Tapti light, and 2 miles north of Suáli sand-hills.

The channel between the banks and the shore, the Sutherland channel, a part of which was called by early navigators Suáli (Swally) roads, is about 3 miles broad; this shore bank projecting out 1½ miles at low water. These are sometimes called the inner and outer sands of Suáli, and are both dry at low water. The eastern reef of the Malaiki banks is very steep-to on its eastern edge, occasioned by the great rush of tide sweeping along it. As the deepest water is within a mile of the dangers on the bank, a vessel, in working, should be warned by the deep water, and go about at the first shoaler cast.

The COAST north of Tapti light has a few sand-hills, called Suáli hills, off which the Suáli bank dries for 1½ miles at low water: it consists of sand at its edge, with mud and sandy mud inside, towards high water mark; but the shore by the Tapti light is very steep-to, and it only dries half a mile off there. Tannah creek, in a bight 7½ miles north of Tapti light, and less than 2 miles northward of Tom Coryat's tomb, is said to lead into Surat river. From Suáli hills to Tannah creek the coast is lined with thick groves of brab, or palmyra trees; but from this creek to the banks of the Nerbudda, upwards of 20 miles, it is low, marshy, intersected by numerous creeks, and overflowed at spring tides from 1 to 4 miles inland.

Dándi Point, a low bluff reddish point, the south extreme of Dándi island, and about 20 feet high, is 13½ miles N. ¾ W. from Tapti light, and has off it some dangerous sands, the passages between which and the Gúlwala bank should not be attempted without a pilot. Bogwa low point is 2 or 3 miles to the northward of Dándi point.

LIGHT.—Dándi low point has a small *fixed* light, visible about 10 miles, bearing N. by W. 14 miles from Tapti light, and 21 miles to the south-east of the light on Perim island.

GÚLWALA BANK, 5 miles to the westward of Dándi point, is between 5 and 6 miles in length, north and south; and its south-west danger is 13½ miles N.W. by N. of Tapti light, and nearly 6 miles to the W.S.W. of the Dándi light.

The north-east danger of the Malaiki banks being distant 8 miles N.W. ½ W. from Tapti light, a vessel from Surat road, when bound to the northward with the flood, will find a course about N.W. to be necessary to lead between Suáli bank and the head of the Malaiki banks, in 13 or 14 fathoms. Or a vessel may keep about 3 or 4 miles from the shore, in soundings from 10 to 13 fathoms, which will lead through the fair channel in passing between them; but when Dándi light bears N.E. she must haul out W. by N. until it bears E.N.E. and Tapti light S.E. ½ S.;

the ship will then be clear to the westward of Gúlwala sand, in soundings from 10 to 14 fathoms, and ought to steer north for Broach road.

From the south extreme of the Gúlwala bank, where depths of 2 and 3 fathoms water were found in 1837, the positions of the Tapti and Dándi lights (since that date erected) bore respectively S.E. by S. 13½ miles, and E.N.E. ¼ N. 5½ miles. The bank was reported in 1853 to have increased further to the south, so it will be prudent not to bring Tapti light to the southward of S.E. ½ S. while in sight. In clear weather, by night, the Perim light will be sighted from aloft soon after Tapti light disappears.

Bogwa Sands.—The sands off Bogwa extend about 5 miles from shore, and are called Gúlwala and Bogwa sands: between them and the main there is a channel through which the small coasting vessels pass in 3 and 4 fathoms water; but at night, or in a large vessel, it is advisable to keep well out to the westward of these sands. From the land of Suáli to Broach bar a continuous bank extends along the shore, which bank at Broach river entrance (where the main land recedes very much) projects out about 5 miles.

BROACH POINT, or Lahára point, on the north of which are Dedj sand-hills, is 20 miles N. by W. from Dándi light, and 11 miles E. by N. ¾ N. from Perim Island lighthouse. This is the highest part of the coast, and consists of sand hills covered with bushes; near by, there are several topes of banyan trees, and a little to the eastward a small grove of brab trees, high, and remarkable for their being all of the same height, except two, which stand up above the rest.

Nerbudda River has its source in the Vindhya mountains, in the British district of Ramgurh in Bengal, at a distance of 800 miles from the Gulf of Cambay. Few rivers have a more direct course; perhaps no river, of the same magnitude and length of course, receives so few important tributaries. The tide is perceptible only 25 miles above Broach, or altogether 55 from the sea; and throughout this tidal length, its breadth exceeds one mile. At Broach, it is a noble sheet of water, 2 miles wide, even when the tide is out.

The town of Broach is situated on the north side of the river, a great way up; vessels of considerable burden may proceed to this place, as the channels are deep in many places, but too intricate to be navigated without a pilot.

ANCHORAGE.—Broach roads, off the bar at the entrance of the Broach or Nerbuddah river, are 5 miles S.S.W. of Broach point and 18 miles north of the southern danger of Gúlwala bank. The bar of the river is about 4 miles from Broach point. A vessel may anchor off the bar with Broach point N. by E. distant 4½ or 5 miles, and Perim light-house W. ½ N. in 6 fathoms at low water.

TIDES.—The tide stream flows at Broach roads till about 4 h. 30 m., on full and change of moon, but high water occurs at 3 h. 30 m.; velocity sometimes 5 or 6 knots per hour, the tide rising above 30 feet perpendicularly at springs.

On the east side of the gulf the flood stream sets about N. by E., and the ebb S. by W., except where their direction is altered by the form of the sands.

The COAST.—From Broach bar to Jumbaseer or Tankária road, a flat, dry at low water, projects $1\frac{1}{2}$ and 2 miles from the shore, with deep soundings close to it, for it is steep-to. The coast from Dedjbára creek to Tankária is very low and marshy. Gundar, the only village near the coast, has a conspicuous building. In passing along here a vessel should keep within 3 miles of the shore, in 7 or 8 fathoms at low water; and, in working, she ought not to stand far off, as the Makráh bank lies 5 or 6 miles off the shore bank, and the tide is so rapid that great difficulty would be found in regaining the shore were the wind to fail whilst she is in the offing.

Dedjbára Shoal is a small sand-bank, with not less than 3 fathoms over it, $1\frac{1}{2}$ miles long, and lying parallel to the shore bank, between which and itself there is a channel half a mile wide with 10 and 11 fathoms water. From the south end of this shoal, the Dedjbára brab trees bear E. $\frac{3}{4}$ S.; and from its north end a single brab bears due East.

MAKRAH BANK, composed of sand, is 11 miles in length north and south, and situated 5 or 6 miles from the Surat coast, between Broach point and Tankária point, its extremities being distant from each of those respectively about 5 miles. In the centre of the bank is a patch which dries at low-water springs, but the general depth is from 1 to 2 fathoms. Its north-east end is broadest, almost reaching to Tankária roads, and no large vessels should attempt to come up here without a pilot, as the tides are so rapid and the soundings very little guide. Between the Dedjbára shoal and Mákrah bank, there is a channel 2 miles wide.

TANKÁRIA BUNDER, on the Dhardur river, is a town on the north shore, about 7 miles E.N.E. of Deojugan, and 9 miles from the anchorage in the Roads. There is a custom house with a creek where boats take in cargo. The river is only $\frac{3}{4}$ mile wide at Tankária. From this river, cotton, grain, and oil are exported in great quantities to Bombay and other places; and small steamers ply between it and Bombay in the fine season.

Tankária, or Jumbaseer road, may be known by the entrance of the river being open, and a pagoda called Deojugan on the north side of it, off which vessels may anchor in 7 fathoms at low water, with the pagoda bearing N.E. by N. $3\frac{1}{2}$ miles, and the nearest land on south bank of Tankária

bearing South-east 4 miles; or the Dedj sand-hills (seen only from mast-head) S. by E. From this anchorage the bar bears East distant half a mile; but to avoid the strength of the stream is the great object, and a good berth can only be chosen by a pilot conversant with the locality. Horsburgh directs vessels to anchor with Deojugan pagoda bearing E.N.E. ½ N. distant 4 or 5 miles, and Jumbaseer point E. by N., with the dry part of some flat distant 1½ miles, and says "here they may ride in safety, the north "part of the flat breaking the strength of the tide;" but it is evident that the banks have altered.

LIGHT.—A small *fixed* light is now exhibited on a mast, 50 feet above high water, at a little distance north of the pagoda. This is called Deojugan, or Tankária light.

ANCHORAGE.—The best anchorage in Jumbaseer roads, in the year 1835, was with the square house N.E. ½ N., and a conspicuous building at the village of Gundar about E. ¾ N., in 7 fathoms, sand and clay; being out of the strength of the tide, and convenient for entering the river.

TIDES.—At Jumbaseer road, high water occurs about 4 hours, on full and change of moon, but the flood stream runs one hour later: the tide rises from 27 to 33 feet at springs; on the neaps 13 to 18 feet. The greatest velocity of tide in the roads is 6 knots.

GONGWA town lies 14 miles N. by E. of Deojugan pagoda; its large trees, which point out the town, are visible from aloft at a distance of 10 or 12 miles. From Jumbaseer to Gongwa the distance is about 17 miles, and the channel formerly used was from 1 to 2 miles wide, but rendered very dangerous by the rapidity of the tides: the soundings in it were from 2 to 7 fathoms, at first quarter flood.

The flat to the northward of Jumbaseer stretches 4 miles from the shore in some places, and a vessel formerly kept within a quarter of a mile of it in passing along in 2, 3, and 4 fathoms, until a small clump of trees was bearing East, then hauled in for the shore, keeping within 200 yards of it, till abreast the town of Gongwa; the anchorage was about one cable's length from high water mark: there vessels grounded in the mud at first quarter ebb.

It must be remembered that the sands and channels in the northern part of the gulf are liable to shift annually by the violence of the freshes. Since 1835 the above channel to Gongwa has closed, and there is no anchorage off the town; quite a new channel having formed, through the centre of the gulf, which leads up to Cambay and into the Mhye river.

From Gongwa to Cambay the distance is about 10 miles; the small vessels, that used to navigate here, always weighed at first quarter flood, and

stood over, keeping the pagoda at Cambay bearing about N. by E. ¾ E., and from N. by W., to N.E. by N. in working when to the northward of Dégom ; for that shore was kept close aboard until they passed that place. The soundings were from 2 to 4 fathoms, with overfalls, and the tide so rapid, that a vessel taking the ground would immediately overset, and probably every person on board perish, a result which has frequently happened through the neglect or obstinacy of the pilots. In this part of the gulf the flood sets N.E. into the Mhye or Cambay river, and the ebb S.W. The smallest vessel should not attempt the navigation without a pilot.

MÁL BANK.—The centre of the upper part of the gulf of Cambay is choked by this large sand-bank, which lies between Tankária and Báonugga. When first surveyed, in 1834, it was described as *three* banks ; the northern called Mál ; a central group of detached banks, called *Terirão's* shoals, from the name of the surveyor's vessel ; and the southern one, the Bahmia bank. But in the next year the banks were so altered as to be only defined as *one* large bank, which of course has many practicable little cuts or boat channels through it. This has been named Mál bank. It is pear-shaped, the stalk being to the southward ; when surveyed in 1835, its length was 16 miles, but it is supposed to be increasing southward.

In 1852 the surveying vessel *Pownah*, when passing from Broach to Gogah, found much shoaler water on its southern end than the only published charts show ; and thus it is supposed that a greater deposit has accumulated at its southern dry extreme, which may now be defined by a line drawn from Gogah to Dedjbára brab trees, at the back of Dedj sand-hills.

There is a channel 2 miles broad between the Makrah bank and the Mál bank, and between the latter and the bank which dries off the shore northward of Deojugan pagoda. The Malcolm channel, round the west side of the Mál bank, is deep, but must not be attempted without a local pilot.

The numerous lights now exhibited in Cambay gulf, render navigation easy ; but the banks and shoals are insufficiently known, as the northern ones change much.

CAMBAY town, 9 miles N.N.E. of Gongwa, is a large town on the north side of Mhye river entrance. In 1820 the native vessels used to lie close to the town ; but from that date till 1836 the stream receded, and a bank formed off the town, preventing vessels coming nearer than 2 miles. In 1836 the surveyor found that bank being rapidly cut away ; he describes it as of sand below, with an upper stratum of clay and mud, about 10 feet thick, which is of course the alluvion from the rivers. In the process of cutting away, the underlying sand is first picked out by the tide, then the upper crust falls in with a loud noise. The cause of the cutting away of

the Cambay bank was evidently the changed course of the Mhye river, which formerly flowed past Gongwa to Cambay; but after the rainy season of 1836 it left the Gongwa shore, and took the mid-channel of the gulf, passing not far east of the Bore rocks (see page 172).

These facts show that any special directions for such a locality are useless; and steamers going to Cambay must take native pilots.

SINGOTEER MÁTA, a pagoda on the point between the Mhye and Sábermati rivers, 12 miles west of Cambay town, is a high building with a flagstaff. The coast is rather high and well cultivated, and great quantities of cattle are reared hereabouts. Deo máta is a small pagoda on the same shore, 6 miles to northward of Singoteer, and abreast of this place the stream was found in December to be nearly fresh at low water.

CROSSING the gulf from SURAT to GOGAH.—Before describing the western shore of the gulf of Cambay, it is thought advisable to give the following directions for vessels plying between Surat and Gogah, or for such as may be caught in Surat roads at the setting in of the S.W. monsoon.

PERIM LIGHT.—Perim island has a *fixed* light, exhibited at an elevation of 86 feet above *high water* level, at which time it is visible from a small vessel's deck 12 or 13 miles; but at *low* tide, when it is between 24 and 30 feet more above water, the light may be seen 14 or 15 miles in clear weather; it bears N.W. $\frac{1}{4}$ N. 21 miles from the Dándi light on the Surat coast, and the gulf between them is perfectly free from dangers; the western edge of the Gúlwala bank, before described, extending nowhere farther than a radius of 6 miles from Dándi light.

The great velocity of the tides near Perim island must be remembered, as, with a scant wind, it is hopeless to keep a vessel under control. On the north-east side, Perim light may be approached within 3 miles, but not within 4 miles on its north, as shoal water exists there (see page 174).

The COAST from Perim island to Sultanpur river has a barren aspect, fenced by rocks, and difficult of access in landing, but may be approached to 5 or 6 fathoms at low water.

GOGAH town has a little *fixed* light, which may be steered for when bearing W.N.W., or W. by N. There is, close off the town, a little gut of deep water, in which one large steamer can comfortably lie, but can only enter or leave towards high water. Having no pilot to point out this convenient berth, a large vessel must anchor 3 miles to the E.S.E. of Gogah light, in 5 or 6 fathoms, clay bottom, on the edge of the Mohumdi bank, with Perim light S. by E., and Kúra point, to the south of Gogah, bearing S.W. by S.

At this anchorage, the large banyan tree, which is 4 miles W.N.W. of Gogah town, will be just open to the northward of the town. At night

the Gogah light will bear W.N.W., and Perim light S. by E. Before this Gogah light was exhibited, vessels were swept away past the anchorage by the rapid flood tide.

Anchorage off Gogah.—When to the northward of the hard ground off Perim, or with Gogah town bearing W.N.W., she ought to haul in directly for it, and anchor in 5 to 6½ fathoms, at low water, abreast of Gogah town, with the lighthouse on Perim S. by E.; the east point of low land by Kúra village S.W. by S., and Gogah light W. by N. ½ N. In running for the anchorage, care is requisite not to get to the northward; for 2½ miles east of Gogah creek there is a bank dry at low water. And it must be observed that the perpendicular rise and fall of tide is 30 to 33 feet on the springs, and that the *stream* flows to about 4 hours on full and change of moon, except when affected by northerly or southerly winds.

A ship, leaving Gogah road with the ebb, must take care that the tide does not set her down on the reef off Perim, or between that island and the main, where the tide runs usually 7 or 8, and sometimes 10 knots per hour, through a narrow gut among the rocks; but there is no safe passage for a vessel, although the island is 2 miles distant from the mainland.

DIRECTIONS for vessels caught in Surat roads or at Gogah at the commencement of the S.W. monsoon.—If a vessel be detained in Surat road until the S.W. monsoon sets in, it will be found very difficult, if not impossible, for her to get to the southward round the foul ground off Dánu or Sunján, as a heavy swell tumbles in upon the shore, rendering it very troublesome to get an offing; and, at the commencement of the monsoon, the wind is so much from the southward. She must therefore, if bound to Bombay, or any other port in the southern or eastern parts of India, proceed to the northward for Gogah, where she may obtain supplies, and from thence work along the west side of the gulf to Goapnáth point, and afterwards to Diu head; from the latter place she may stretch off from the land, and will reach Bombay without tacking.

A ship departing from Surat road, or when driven from it by the south-west winds setting in strong, ought, with the flood tide, to steer about N.W., keeping in 13 or 14 fathoms until through the channel between Suáli bank and the head of Malaiki banks. The same course continued, unless the tide is very strong, will lead her upon the hard ground off Perim island, which is an excellent guide in the night or in hazy weather; she ought to keep along the edge of it in 12 to 14 fathoms, about 2 or 3 miles distant from the island, taking care to edge away to the northward if the depths decrease considerably, the Perim lighthouse being her guide.

NAVIGATION of the GULF.—Excepting the Mál bank, and the detached shoals off its south end, extending nearly 5 miles to the E.N.E. of Gogah, the gulf is clear of danger across to Broach point, but that Mál bank now dries more to the southward than formerly, according to the testimony of native boatmen.

If necessitated to leave Surat road by strong southerly winds, and not intending to run for Gogah, you may with the last of the flood, if the weather become favourable, stretch across the gulf to the northward of the head of the Malaiki banks for the coast about Sultanpur, where you may anchor in smooth water to the northward of the bank abreast the river, taking care not to bring Tullijah hill to the northward of W. ½ N., as the Sultanpur shoal has its north end almost on that bearing of the hill. The coast between Perim island and Sultanpur shoal is safe to approach into 8 or 9 fathoms. If enough ebb remains, or with the next ebb, a vessel may work to the southward round Goapnáth reef and point, if circumstances permit, and afterwards to the westward along the coast to Diu.

To beat from Goapnáth point, or from Gogah, to Diu head, after the S.W. monsoon is commenced, may not be always practicable, when the wind hangs to the southward; but a handy ship that sails well, having very good canvas and proper ground tackling for working tide work, may probably find little difficulty in doing it; for this the moonlight nights may be considered most favourable, the winds being then not so violent in general, as during the spring tides at the change of the moon.

A ship, being well prepared to encounter strong winds, and if bound to Bombay or other parts of India, should sail from Gogah road at high water, and steer round the N.E. part of the hard ground off Perim; when round it she ought to work to the southward with the ebb, and may stand in to 7 or 8 fathoms in tacking from the shore.

Sultanpur river is 7 miles North of Goapnáth point, having a conical hill inland about 5 miles to the N.W., called Tullijah hill: when this hill is brought to bear northward of West, a ship must keep farther from the shore; for, abreast the entrance of the river, at 4 miles distance, there is a dangerous bank, called Sultanpur shoal (see page 176), nearly even with the sea at low water. It is about 2 miles long and half a mile broad, having 5 or 6 fathoms within it, and is steep-to on the outside, having 17 fathoms about one mile off, and 12 fathoms close to it.

From the northern end of this foul ground Goapnáth point is 9 miles distant, and bearing S.W. ¾ S., and Tullijah hill W. by N.

Having reached the shoal off Goapnáth point, it will be prudent to choose daylight to work through the channel between the south end of it and

the N.W. extremity of the Malaiki banks, as the soundings are no guide, the depths being 15 to 18 fathoms from side to side, and the channel scarcely 4 miles broad. In this, which is called the Grant channel, between the western Malaiki bank and the Katiawár coast, the bottom is mud, but as you approach the banks you get sand. When round the shoal off Goapnáth point, every advantage of the tides should be taken, by anchoring when they are unfavourable, and keeping near the coast in working along, observing, as noticed in the description of this coast, that the soundings give little or no warning of the approach toward the shore, there being 8 and 9 fathoms close to it in some places, and the same depth 10 or 12 miles off. When near Seárbet, or Shalbet island, or near Jafrabad, longer tacks off shore may be made occasionally, the ship being then to the westward of the S.W. extremity of the Malaiki banks; but it will be proper to continue to work within a reasonable distance of the coast, keeping near it till she reach Diu head.

Having worked thus far to the westward as Diu head, stretch out from the land with the ebb tide, and if the wind incline from the westward, a ship will probably get into the latitude of the entrance of Bombay harbour, at a considerable distance from it, without tacking; but if the wind incline to the S.S.W. or S.W., it will be proper to tack occasionally to preserve the westing; for she must by no means approach near the coast to the northward of the entrance of Bombay harbour, whether bound into it, or to the southward along the coast of Malabar to cape Comorin. Were she to get near the land to the northward of Bombay harbour, it would be found very difficult, if not impossible in bad weather, to work to the southward round the reef, against the heavy sea and northerly drain of current setting along shore, especially with the flood tide, at the beginning of the monsoon; but, well out from the land, the sea runs more regularly, and advantage can be taken to tack with favourable squalls or shifts of wind, whereby a ship will generally gain ground in working against the monsoon to the southward.

If a ship intend to work along the Gúzerát coast to Diu head, a pilot for the gulf of Cambay should be on board, who may be procured at Surat or Gogah, and he may probably be conveniently landed at Diu, in passing, or carried to Bombay, as circumstances may require.

In crossing the entrance of the gulf of Cambay from Diu to Bombay, the soundings will unmistakeably tell what leeway the vessel makes, from being swept into the gulf, as the line of 20 fathoms extends straight from Diu to the offing by Bombay, and a ship should not shoal under 20 fathoms in the S.W. monsoon (of which season alone we are now speaking) until she sights some of the Bombay landmarks, or is to the southward of the latitude of Kundári island.

The BORE.—It may be well in this place to give some description of that dangerous rushing tide, called the Bore, in the gulf of Cambay; because navigators, going to the northward of Perim island, should be on their guard against it.

The tides throughout the gulf are extremely rapid, and the rise and fall great. The whole shore, bordering on the sea, is low, and overflowed for some distance inland at high springs, being intersected by numerous small creeks and ravines.

The Bore is a rapidly flowing tide-wave, forced through a narrow passage, over the remains of the ebb tide, the counter-action of which helps to give the wall-like aspect of the Bore.

Below Gongwa on the east side of the gulf, and Dhólera on the other, there is no bore: but to the northward of these places there are two.

The Eastern or principal Bore rises to the eastward of the Bore rocks, about 11 miles south-west of Cambay town, and is not perceptible on the neap tides, unless the previous springs have been very high, when it may be noticed slightly through the quarter. When the springs begin to lift, it plainly shows itself, increasing in height and velocity till two days after new or full moon, when it declines.

When new moon coincides with *perigee*, and the full moon with *apogee*, the highest tides are said to occur. The Bore varies with the night and day tide, the former being 6 to 8 feet higher than the latter, between September and April; and as the flood stream of both night and day runs for the same length of time, about 3 hours, the highest, or the night-tide in the fine season, and day-tide in the rainy season, must have the greatest velocity.

In January 1837, at very high springs, in Cambay creek, about 5 miles W.S.W. of the town, the Bore was observed 6 feet high, advancing at the rate of 10 knots per hour, with a loud noise, between the steep cliffs on the north and the sand-bank on the south, in a passage about 500 yards broad. A quarter of an hour after the bore-wave had passed, the stream was found running at the rate of $4\frac{1}{2}$ knots only; but, three-quarters of an hour after its passage, the flood stream attained the velocity of 8 knots, afterwards gradually declining; the ebb stream beginning 3 hours after the passage of the bore-wave.

The rise of the night tide in those three hours of flood was 31 feet, and the rate of its rise was as follows:—In the first 10 minutes of flood-tide the water rose 6 feet; in the first hour $18\frac{1}{2}$ feet; in the second hour $8\frac{1}{2}$ feet; and in the third hour only 4 feet.

From the above position where these facts were noted, the Bore rushed onwards to within 3 miles of Cambay; then, deflected by a sand-bank, the principal stream turned over to south-east towards Kévi bunder, and

thence north-eastward to Dawan, on the Mhye river; the lesser stream moving on past Cambay town, and losing itself over the banks.

The day tide at the above position only rose 23 feet. The ebb tides run steady, but do not acquire their greatest velocity, which is about 7 knots, until more than half tide, when the high banks are uncovered, and the stream is confined to its narrow channel.

Off the village of Dawan, on January 10th, 1837, the Bore was observed 7 feet high, with an initial velocity of 10 knots; but, after the wave's passage, the speed was reduced to 5 knots, increasing again to 7 knots three-quarters of an hour afterwards, when it gradually got weaker till the ebb made.

The Western Bore, which runs up the Sábermati, is very similar to the other, but of less elevation and force; but both tend to cut away the banks and form new ones, so altering the channels as to render their navigation by strangers an enterprise not to be attempted. On the west bank of the Sábermati, between Amli creek and East cape, the surveyors in 1837 found that a strip of bank, of a breadth from 700 to 1,300 yards, throughout a length of 5 miles, had disappeared in one year.

The above description of the Bore shows that the flood tide comes with a sudden burst at great velocity; then, decreasing in strength for a time, attains its full strength about three-quarters of an hour after the passage of the bore-wave. The stream afterwards never attains the same velocity as the wave of the Bore.

CHAPTER VII.

KATIAWAR PENINSULA.—CAMBAY TO DIU HEAD.

Variation of Compass, from 0° 20′ East, to 0° 15′ West, in 1865.

The west side of the Gulf of Cambay is formed by that portion of the Gúzerát dominions, which, though generally called the peninsula of Katiawár, comprises the petty states of Báonugga, Babriawár, Junaghúr, and others. Of the whole territory of Gúzerát, 19,850 square miles, or nearly one half, are stated to be comprised within the *peninsula*, or that part which may be marked off from the continent by a line drawn from the head of the Gulf of Cutch to the head of the Gulf of Cambay.

The length of the Katiawár coast now to be described is 150 miles; that is, 70 miles in a southerly direction from Koon Bunder to Goapnáth point, and thence 80 miles in a mean W.S.W. direction to Diu Head.

From Koon Bunder to Báonugga the shore is principally mangrove jungle for several miles inland; in parts covered with a coarse grass unfit for cattle; numerous creeks intersect it, and high tides overflow it for a considerable distance inland. Towards Gogah it gets higher and some little hills are seen in the background.

The coast from Gogah to Matowra, about 20 miles, is tolerably high, much broken with ravines near the sea, and having trees near the villages. The country belongs to the Rajah of Báonugga, whose territory extends round Goapnáth point and to the westward as far as Chanch creek.

The coast between Matowra and Goapnáth point is low, fringed with sand-hills, and the shore bank dries off to the distance of 2 miles. Inside the sand-hills the country is low towards Sutrinji river, and overflowed at spring tides; southward of that river to Gadúla or Gadúra, a little northward of Goapnáth, there is a low sandy shore; the country inland is open and rather well cultivated, with no bushy trees except near the villages, but the leafless thorn bush is to be seen all over the country.

Goapnáth point, the south-east extremity of the Katiawár peninsula, is of moderate height, and visible in clear weather upwards of 15 miles. The whole of this coast, from Goapnáth to Chanch, is of sandstone formation. The country inland is undulating, and averages in height about

100 feet along the seaboard, but rises toward the interior of Katiawár. Eastward of Shalbet island, however, there are no remarkable hills seen from sea, except Paulatána mountain, which is 20 miles inland.

Towards the sea the coast presents high perpendicular cliffs, where frequently the rock overhangs, rendering it in many places inaccessible. The cliffs are hollowed into caves, and formed into sharp projecting points, attesting the violence of the S.W. monsoon sea and the friable nature of some layers of this sandstone. The coast is rock-bound, but the bays are mud and sand; it is everywhere safe to approach, from 5 to 9 fathoms being the average depth within two cables' lengths of the cliffs.

At the back of Jáfrabad, the country inland becomes more mountainous at the distance of 10 miles from the sea. The Girh hills commence about 20 miles to north-east of Diu, and extend over 40 miles of latitude, in which space nearly all the rivers of Katiawár have their source. They consist of a succession of ridges and isolated hills, covered with forest trees and jungle, and with a surface extremely rugged; caverns and deep ravines are very numerous; they are the haunt of lions, leopards, wolves, jackals, foxes, wild cats, and wild swine; porcupines also are very numerous. On the plains southward of Gogah, the nil-gháo with deer and antelopes are plentiful, and so are wild fowl in the cool season. Vast bodies of migratory rats sometimes move over the peninsula, none knowing whence they come, nor, on their disappearance, whither they go; they are double the size of the common rat, and their ravages in some years are of alarming extent.

The grains principally cultivated are bájri (millet), joári (maize), and wheat. The sugar-cane is grown to a considerable extent. Cotton is the principal commercial crop. The soil is not fertile, being in general rather sandy, and requiring much irrigation for the production of crops; but for this there are ample means, as, besides the many streams throughout the country, water is in general close to the surface, and wells are very numerous, especially in the southern part of the country.

The south-east coast of Katiawár from Diu head to Goapnáth point, is generally bold and safe to approach, of moderate height, though rather low in some places. Trees, or the appearance of cultivation, are seldom perceived, being confined to the vicinity of the villages, and it is destitute of a good harbour where ships could easily enter and ride with safety during a gale of wind. Shalbet island might be made available as a harbour of refuge, or even as a commercial port, for the south-east coast of Katiawár.

The depths along this coast are nearly equal at different distances from the shore; the soundings, therefore, do not give sufficient warning, nor

always denote the distance off. Off the more prominent capes and rocks the greatest depths are found; thus, as in the Gulf of Cambay, a deep cast should give warning of the approach to a shoal.

KOON BUNDER, at the entrance of Amli creek, on the west shore of the Sábermati river, and 4 miles to the westward of Singoteer Máta pagoda, is the northernmost port in the Gulf of Cambay. The channel into it from East cape is close along this west shore. The whole of the sea face of this west coast, down to Báoliári creek, is a mangrove jungle for several miles inland, in parts covered with a coarse grass unfit for cattle; it is intersected by numerous creeks, and at high springs is overflowed to a considerable distance.

LIGHT.—Koon Bunder has now a light exhibited on a mast, *fixed*, 48 feet above high water, on the west bank of Sábermati river, and bearing W. by S. 4 miles from Singoteer Máta. Between the 15th June and September 1st., this light is not exhibited.

EAST CAPE was in 1837 about 7 miles S.S.E. of Koon bunder; but, being so liable to shift, this land, which could not be recognized even by those who surveyed it after one year's absence, cannot be described with any accuracy.

The Coast between East cape and Báonugga, an extent of nearly 30 miles, has 3 creeks on which are towns of some importance in the cotton trade, Dhólera, Báoliári, and Soondri; but vessels going to these must take pilots.

BORE ROCKS, at the entrance of the Sábermati river, in the above year, bore S.E. by E. 2 miles from East cape, and 8 miles South of Singoteer Máta. No description of them is recorded by the surveyors; but, from bearings of them being noted at high water of neap tides, it is concluded that, if covered at all, they are only so at high water springs.

BÁONUGGA town, bearing S.S.W. ½ W. 27 miles from East cape, is a large place, but difficult of access, being approached by a winding creek; off the entrance to which a vessel may anchor in from 7 to 10 fathoms, having the Báonugga shoal about a mile to eastward, and with Gogah light bearing S. by E. ¾ E., or Perim light S.S.E. ½ E., the centre of Báonugga town about West, and the large banyan tree between Gogah and Báonugga S.W. by S.

Báonugga is a place of considerable trade. Though under the jurisdiction of the British district of Ahmedabad, it is the residence of the Rána or chief of Gohilwar, hence called Thakoor of Báonugga. Native pilots must be had to take a vessel up to the town.

Baonugga Shoal is a sand-bank lying 1½ miles from the shore bank, and between 6 and 7 miles to the eastward of that town. The ship channel is to the westward of Báonugga shoal, and through it the tides run 6 knots an hour at the springs.

CENTRAL BANKS of the GULF.—To the south-east of the Báonugga shoal there are shifting sands for a distance of nearly 5 miles; these may be said to be connected with the Rhuk bank, the north end of which is off Báoliári creek.

There is a patch of 3½ fathoms on what may be called the *tail* of the Great Mál bank, E.N.E. of Gogah, and rather more than 6 miles north of Perim lighthouse. Again, further to the eastward, there were found,* in 1852, soundings of 7 and 8 fathoms, near where 30 is marked on the chart,† about 6 miles N.E. ½ N. from Perim lighthouse. There is reason to believe that shoal water did *formerly*, at the time of the survey, exist there; but that part was not thoroughly examined. Throughout the Gulf of Cambay, a cast of very deep water indicates the near approach to a shoal. Doubtless all these banks are extending further to the southward, and we know they frequently shift their position during the stormy season.

GOGAH, a walled town, situated 9 miles to the south-east of Báonugga, has a small *fixed* light on its north-east side, which is 6¾ miles N.W. ½ N. from Perim light. There is a large banyan tree at 4 miles W.N.W. of the light; and to south-west of the town, at the distance of 3 cables, is a large peaked tree, very conspicuous, with 2 brab trees to the south-east of it. The best lascars in India are natives of this place. Ships touching here may procure water and some refreshments. Firewood is scarce.

Gogah road is a safe place for vessels to remain at during the S.W. monsoon, or to run for (see page 165), if they part from their anchors in Surat road, having a considerable extent of anchoring ground, with mud and clay bottom.

Gogah shoal is a narrow sand-bank lying in the direction of the stream, its south end being nearly 3 miles east of the town. One mile north-west of it, or two miles north-east of Gogah light, is a little rock called Perigee rock, which covers and uncovers; at low water of ordinary springs being just awash, and sometimes being 3 or 4 feet above water. South of Perigee rock, and east of Gogah white mosque, there is a patch of clay, having only 5 feet at lowest tide.

---

* Surveying vessel *Pownah*.

† *See* Chart:—Cambay Gulf, by Ethersey, No. 51; scale $m = 0{\cdot}5$ inches.

LIGHT.—At the north-east angle of the town a small *fixed* light is exhibited, estimated at about 40 feet above high water, but visible only 7 or 8 miles. The light is close to the mouth of Gogah creek, which runs along the north side of the town.

Mohúmdi Bank, the shore bank stretching from the rocky reef off Kúra point to the entrance of Báonugga creek, is principally composed of a red and yellow clay, with occasional patches of sand; the Gogah shoal is one of such sandy patches on this Mohúmdi bank: all the rocky part on the south end of the Mohúmdi bank is comprised within a radius of 3 miles from Kúra village to the north-east.

There are two shoal banks, nearly dry at low water, 2 and 3 miles to the eastward of Gogah light; to avoid these, when anchoring near Gogah, keep the large peaked tree and 2 brabs in sight to the southward of the town walls; but a small vessel arriving here towards high water can go over all the shoals, and pick out deep water for anchorage.

ANCHORAGE.—There is a little gut of deep water off Gogah town, which the natives can point out; but, owing to the numerous patches of shoal water on Mohúmdi bank, large vessels must anchor in 5 to 10 fathoms, clay bottom, about $3\frac{1}{2}$ miles from Gogah, with Perim lighthouse S. by E., Kúra point S.W. by S., and the north brab and peaked tree in one, bearing about W. $\frac{3}{4}$ N., or with the large banyan tree 4 miles W.N.W. of Gogah, just open to right of the town. From this anchorage the northern shoal patch of Perim reef, having only 6 feet water, bears S.E., distant one mile; marks to avoid this Perim shoal are given below.

TIDES.—At Gogah it is high water, full and change, at 3 h., but the stream flows on for a full hour afterwards, though the water has fallen more than a fathom. Rise and fall at very high springs 34 feet; ordinary springs 27 to 30 feet; neaps 12 to 18 feet.

Through the deep gut between Perim and Kúra point, which is at lowest water little more than half a mile wide, the tide rushes with great velocity, generally 7 or 8, and sometimes 10 knots, therefore the passage had better not be attempted.

PERIM ISLAND.—The centre of this island, where the lighthouse stands, bears from Gogah light S.E. $\frac{3}{4}$ S. $6\frac{3}{4}$ miles; from Broach point about W.S.W. 11 miles; and from Dándi light N.W. $\frac{1}{4}$ N. 21 miles. That part of the island which is always above water, extends for half a mile to the north-west and south-east of the lighthouse, but is very narrow. The rocky reef which surrounds it projects furthest to north and south-east; and although this, when dry at low water, appears quite steep-to, yet a gradually shoaling sand and clay bank extends off it on the north, east, and south; but on the west it is very deep-to, and between

the north-west end of the island and Gogah, where at low water the passage is reduced to a width of little more than half a mile, there is a depth of 60 fathoms; here the strength of the ebb tide was once *estimated* at 12 knots; the surveying vessel went through it, but was perfectly unmanageable, being turned round frequently by the strong eddies. The bottom in this channel is a yellow clay.

The soil on the island of Perim is sandy, with low sand-hills on the west and north end; the east side is cultivated by the people in charge of the light. There is excellent water in a well 26 feet deep. The base of the island is pudding stone, which is exhibited at low water at the south end of the reef, which terminates in a cliff, exposing horizontal strata of pudding stone, from 1 to 3 feet thick, alternately with fine clay only a few inches thick. Many fossil bones have been dug out of the reef.

The great velocity of the tides near Perim island must be remembered, as, with a scant wind, it is hopeless to keep the vessel under control. On the east the island may be approached within 2 miles; on the north-east not within 3; but on the north not within 4 miles, as a shoal rocky patch, which is here called Perim shoal, having one fathom only, lies on the north side of Perim bank, and a cable's length to the west of this shoal there is a depth of 30 fathoms. Little or no flood stream is felt on the north of Perim reef, but the ebb is very strong.

Perim Shoal, having only one fathom water, the above northern danger, 3½ miles North of the lighthouse, is avoided by the following landmarks. Two brab trees situated 3 cables' lengths to south-west of Gogah town wall, and a large bushy peaked tree to the west of them. The north brab cutting the north side of the large peaked tree is the mark for rounding closely the northern dangers of the Perim shoal. A vessel is in danger if she has the large peaked tree open to the left of the north brab, until Perim lighthouse bears S. by E. The anchorage for large ships off Gogah is one mile north-west of this shoal; there, only towards high water, is the swell in the S.W. monsoon troublesome.

LIGHT.—Perim lighthouse shows a *fixed* light, 86 feet above high water, on a mast, above a solid stone basement 25 feet high, situated on a sand-hill. At high water it is visible 12 or 13 miles, and at low water 14 or 15 miles, from a vessel's deck in clear weather.

MÉTIVÉLI is a village 9 miles S.S.W. of Kúra point; between them the bank of clay extends from 2 to 3 miles off shore, and is good anchorage, but the shore itself is fringed with rocks, and is not easy landing Inland the country is hilly: Morchund, a village 4 miles N.N.W. of Métivéli, being situated at the foot of a hill; there are thick trees round all the villages, and the black thorn bush, without foliage, grows in the valleys, forming thick jungles; several streams of fresh water fall into the sea for a short time after the rainy season, along this portion of coast.

GÓRIÁLI, a village with a white tower, a conspicuous mark from seaward, stands 2 miles inland, and 3½ miles to the south-west of Métivéli; between Góriáli and the sea stands Sónchia village, and the land is hilly and covered with grass. Off Sónchia are patches of rocks, one mile off shore, having 7 fathoms close to them, therefore vessels should not shoal under 10 fathoms.

MATOWRA is a small village, bearing S.W. ½ S. 7 miles from Métivéli, situated on the south extreme of the hilly country. The bank off it is gradually shelving, and safe to approach into 5 fathoms to the northward of Sultanpore shoals.

Tullijah Hill, bearing 8 miles W.S.W. from Matowra, 10 miles N.N.W. from Goapnáth point, and 4½ miles to the north-west of Sultanpore, is a small steep hill of conical form, about 400 feet above the sea, and rising out of a level plain; there is a range of hills between it and Báonugga. On the top of Tullijah hill is a Hindoo temple, having tanks of excellent water; the hill has caves excavated in the solid rock, where formerly the pirates of these parts dwelt, even as recently as the year 1823.

Paulatána mountain, spoken of by early navigators as Setrujah hill, and standing about 13 miles N.W. by W. ½ W. from Tullijah hill, is estimated to be about 1,500 feet above the sea, and may be seen in clear weather from a greater distance than Tullijah hill. Paulatána, though not marked on the charts, is upwards of 20 miles to north-west of Goapnáth point. It is of trappean formation, and celebrated for its numerous Jain temples and monastic establishments of those singular religionists, who are rather numerous in Katiawár, where there is scarcely a village of any size which has not several of their families. On Paulatána and the Girh mountains (Geernar) their principal temples are found.

SULTANPORE, a small trading port, the first to the southward of Gogah, on the banks of the Sutrinji river, bears S.W. by S. 7 miles from Matowra. Good water may be obtained from a well close to the bunder or landing place, about a mile within the entrance of the creek. There is good anchorage for small craft, in 3 fathoms, mud, between the Sultanpore shoal and the town. The Sutrinji river has its source on the north-east of the Girh hills, and runs past Paulatána mountain, which was therefore called by early navigators Sutrinji or Setrujah hill.

SULTANPORE SHOAL, of rock, sand, and clay, with a patch of sand nearly dry at lowest spring tides, lies 4½ miles east from the entrance of Sutrinji river. The north end of this foul ground bears N.E. ¾ N. 9 miles from Goapnáth point. With Tullijah hill bearing W. ½ N. a vessel is clear to the northward of it. It is almost connected with Goapnáth point by other banks, between which, however, there are passages. Horsburgh and old navigators give the following mark for the fair channel through these

shoals, "Tullijah hill on with Settrujah hill," (Paulatána mountain); but recent charts do not show that the water is deepest there now.

TIDES.—Inside the Sultanpore and Goapnáth shoals, it was found to be high water, full and change, at 2 h. 25 m.; but the ebb stream did not make till more than one hour afterwards, and continued for more than 1½ hours after the water had commenced rising by the tide-gauge on shore. At neaps the flood stream was found to run 2 hours after actual high water. Rise and fall at ordinary springs was 16 feet; at high springs 18 or 19 feet; at neaps 9 or 10 feet.

GOAPNÁTH PAGODA, a Hindoo temple, situated near a prominent point of the same name, stands about 150 feet above the sea, and is 6 miles south of the entrance of Sutrinji river. The temple, not a remarkable building, is nearly surrounded by a copse of bushy trees, three-fourths of a mile to N.N.W. of the tip of Goapnáth point, and may be seen in clear weather 15 or 16 miles.

Goapnáth Shoals.—Off Goapnáth point a reef extends to north-east, almost joining the Sultanpore shoal. South of the point the coast may be approached quite close into 7 fathoms. The channel between Goapnáth shoals and the Malaiki banks is only 6 miles broad.

Soundings.—The nearest dangerous shoal patch of the Malaiki banks bears S.E. 6 miles from Goapnáth point; the intermediate soundings are irregular, and the depth is no guide, but sandy bottom will be found by the banks, and mud towards the shore of Katiawár. The bed of this channel, between the coast and the Malaiki banks, appears to be very flat; and, as Horsburgh states, the soundings do not show how far a vessel may be off shore.* The coast to the westward of Goapnáth point is of sandstone, presenting towards the sea high perpendicular cliffs. It is everywhere safe to approach into 6 fathoms, at low water, this depth in some parts being close to the cliffs.

JANMEER, the largest village south of Gogah, lies 3 miles W.S.W. of Goapnáth point. It is a walled town with the remains of an old fort, formerly a notorious piratical place, as was also Rajpúr, halfway between Janmeer and Goapnáth point.

MAITLAH POINT, 7 miles S.W. by W. from Goapnáth point, is a low rocky point projecting to the southward, having to the westward a sandy bay and low ground, but rising to the north, till at half a mile it attains the average elevation of the undulating Goapnáth land, rather more than 100 feet. There is a little creek on the west side of the point, only available for boats towards high water, and during easterly winds; Maitlah village

* *See* Chart:—Kattywar coast, by Ethersey, No. 50; scale $m = 0{\cdot}6$ of an inch.

is about 2 miles north of the point. There is a little rocky islet, two-thirds of the way to Janmeer, and 2½ miles to north-east of Maitlah point, connected to the shore by rocks at low water ; all this coast is rocky.

KOOTRAH BLUFF is high and facing eastward, being 2 miles W.S.W. of Maitlah point, and forms the west side of that sandy bay. During westerly winds, boats can land on the north side of this bluff point.

JÉGRI BLUFF, or Jigi point, the east end of an island near Mowah bunder, bears S.W. by W. ½ W. nearly 11 miles from Kootrah bluff; as viewed from the southward its top overhangs the sea. A shoal with 2 fathoms projects nearly a mile to the eastward of the bluff, but there is deep water to the north of it, where slight shelter may be had in westerly winds. This point is sometimes called Kutpoor bluff, after the village in the deep bight to the north-west of the bluff.

Between Kutpoor and Mowah is an extensive swamp, which at high water isolates this strip of land on the sea coast, and breaks into the sea by the village of Nikól, 3 miles to the north-east of the bluff, and this swamp reaches beyond Mowah bunder to the westward. The creek which passes Nikól village has its mouth at the east end of Kutpore island, 3 miles N.E. from Jégri bluff, and runs up to Wágnugga, a village 2½ miles from the sea.

MOWAH BAY, situated on the west of Jégri bluff, cannot be said to afford shelter to any but small coasting vessels, which can at high water run up the creek to the bunder, 2 miles from the mouth of the bay. Kutpore town is little more than one mile east of the bunder.

Mowah Town is a large place, 2 miles north of the bunder, having several large buildings, and a Hindoo temple which is visible from some distance. Good water may be obtained from a well on the island of Jégri, at the bottom of Mowah bay. Gadúra is a small village nearly 4 miles west of Jégri bluff, standing on a high sandstone cliff, which is washed by the sea.

The bed of the sea between this place and the Malaiki banks is very flat ; muddy bottom is not found further than 8 or 9 miles from the coast.

TIDES.—At Mowah bunder it is high water, full and change, at 1 h. ; ordinary springs rise 12 feet, neaps 7 feet. In the offing, the flood stream sets N.E. by E. ½ E. 2½ knots ; the ebb to W.S.W. 3½ knots, this latter running for nearly 2 hours after the water along shore had begun to rise.

ISLET POINT, a prominent hilly point, with several islets off it, lies 8 miles W.S.W. of Jégri bluff. These islets are, at low water, all connected with each other and with the shore by rocks extending to the eastward ; the outer point of which has a depth of 9 fathoms close to it, and lies mid-

way between the southern islet and the village of Gadúra, and 1¼ miles from the shore high-water mark. The southern islet is steep-to, and on its west side is Putwa bay, between 2 and 3 miles broad.

CHANCH town, situated in the middle of the sea face of a narrow island, is 6 miles W. by S. ¾ S. from Islet point: midway between them is the small village of Kaira, on a projecting point of the coast. Chanch island is between 4 and 5 miles in length along the sea shore, but nowhere half a mile broad; it is highest to the east of Chanch town. There is an extensive mangrove swamp at the back through which runs Chanch creek, the entrance of which is to the north-west of Shalbet island, and it runs up to several villages 5 miles to the northward of Chanch. The island of Chanch is the western limit of the territory of the Rajah of Báonugga.

ABUSÁLIA ROCK bears S.W. by S. 3 miles from Chanch town, and rather more than one mile E.N.E. from the eastern conspicuous bluff of Shalbet island. There is deeper water, 15 and 16 fathoms, to the south-east of this rock and of Shalbet island, than anywhere else along this portion of the coast. And here it may be noted that, as a general rule along this coast, where rocks project from the shore, the water is deeper close to them than in the offing, owing to the scouring of the currents.

SHALBET ISLAND, standing about 2 miles from the main, and about 10 miles S.W. by W. of Islet point, is about three-quarters of a mile long on its sea face, which is steep-to and tolerably high. It is little more than half a mile broad, and has old fortifications on its north-west and south-east points, the latter being of strong construction. Being lowest on its north side, where the village of Shalbet (Scarbet) is, the island rises to a steep cliff at the sea face, which is deep-to, having 10 or 12 fathoms close to the shore, but a sand-bank with only 6 fathoms lies about one mile off it.

The island is of sandstone, and belongs to the Rajah of Jafrabad. Good water may be had from a well in the centre of the island. This was formerly a famous piratical stronghold, and might be made a safe harbour, as one is much wanted along the south coast of Katiawár. Chanch creek extends some 6 miles to the north-east of Shalbet, and has several branches through that extensive swamp.

The coast, westward of Shalbet, forms in a high projecting bluff, the south-east point of which bears W.S.W. 2 miles from the west point of Shalbet; the rocky reef from the bluff extending eastward over nearly two-thirds of that distance, and rendering the passage into Shalbet harbour difficult, unless marks or lights be erected.

The detached islet on its east side, which may be said to be part of Shalbet island, is of nearly equal elevation, and conspicuous from its east end being a steep well-defined bluff. On its west extreme, which is a

peaked bluff, is the house of a Pir (a Mahomedan saint), with the usual little white flags by it; which may be seen about 9 miles off.

ANCHORAGE.—On the north side of Shalbet there is capital anchorage, affording shelter in the S.W. monsoon; but the entrance, which is half a mile W. by S. of the island, is narrow, between a shoal bank off the island and a reef of rocks from the main land, thus reduced to a breadth of only 2 or 3 cables. At this anchorage there is 5 or 6 fathoms, muddy bottom, at the distance of 3 cables' lengths from the north-west point of the island, and the same distance from the south spit of Chanch river bearing north-west.

To the eastward of this anchorage the water is shoal, but a vessel could run out at high water, in 4 fathoms, taking care of the sand-bank which extends off the island for a distance of 2 miles east of the anchorage.

Another Anchorage may be found between Shalbet bank and Abusália rock, half a mile W. by S. of the latter, where there are 6 or 7 fathoms, mud, protected a little by the reef, which, projecting eastward from the S.E. point of Shalbet, may be brought to bear S. by W., though only visible at low water.

TIDES.—It is high water, full and change, at Shalbet island, at 12 h.; rise at ordinary springs 9 feet, at high springs a little more; at neaps 4½ feet.

JAFRABAD harbour, 7 miles W.S.W. of Shalbet, affords no shelter for large vessels, though convenient for small coasters, which can get into the river and up to the town, which is nearly 2 miles from the point forming the west side of the bay. Small craft can lie on the north part of that point, in the mud at low water. Large vessels must lie outside in 7 or 8 fathoms, half a mile east of the point.

Jafrabad, which is a walled town, more than a mile within the river, has several towers, with a flagstaff on the highest, which can be seen from the anchorage over the intervening high ground. Next to Diu, Jáfrabad is the most considerable place for trade on the southern coast of Katiawár. It is said to belong to the Sidi, or Abyssinian chief of Jinjira (Rajpúri) on the coast of South Konkan, and to be governed by an officer holding under him; this territory, including 11 villages annexed to it, possesses a population estimated at 5,680.

Nandivéli mountain, 1,847 feet above the sea, the south-east peak of the Girh hills, stands 17 miles to the north-west of Jafrabad. About 10 miles to the north-east of this mountain there is one called Dhuans ke donghur, or Smoke hill, only seen in clear weather; and eastward of this it is all hilly country as far as Mowah. Between Nandivéli and Jafrabad are two hills more conspicuous than others, the Conical hill, 7 miles to

the north-west of the harbour ; and Round hill, of about equal elevation, perhaps 500 or 600 feet, 3 miles to the westward of the conical hill: these two hills stand out better than the rest of the range.

Water.—Though a convenient place to water at, the water is not very good. It is procured from a well between the town and the point.

Firewood is scarce, and so are supplies of all sorts for shipping, but good poultry may be had.

TIDES.—It is high water, full and change, at 11 h. 35 m.: ordinary springs rise 9 feet ; high springs, 10 feet ; neaps, 4½ feet. Outside of the harbour, at neaps, the stream of ebb ran more than 2 hours after it was low water by the shore, and the flood stream continued more than 1½ hours after high water. At springs the ebb ran 2¼ knots an hour to the W.S.W., and the flood 1½ knots to E.N.E.

MUREX REEF, which is only exposed at low water, (so called from the shells of the black murex species being found there,) lies three-quarters of a mile from the coast, commencing 4 miles W. by S. of Jafrabad point, and extending like a wall for nearly 2 miles. It is steep-to ; and has, just off it, deeper water than is elsewhere found in the vicinity. On its west side, towards Rajpúr, the coast is higher than the Jafrabad side ; and the east extreme of it, overhanging the reef, is called Murex bluff, which is W. by S. ½ S. 5½ miles from Jafrabad point.

This is the south-east limit of the territory of the Nawáb of Júnaghúr : the village of Roinsia, midway between Murex bluff and Rajpúr, being the frontier village.

RAJPÚR, a village on the west side of a little bay, is 5 miles W.S.W. of Murex bluff, having high ground with steep cliffs to the west, but swampy ground to the north. There is an old dark building on the rocky point, resembling a fort, but in reality only a granary.

BAINSLA ISLET, 2⅔ miles to the south-west of Rajpúr, is a rock, having deep water on its north and north-west, and apparently connected to the mainland by a reef of rocks running W. by S. from this islet to a point more than one mile distant, on which stands Semah fort, between which and Rajpúr the coast forms a deep bight, over which the sea spreads much at high spring tides.

SEMAH FORT belongs to the Portuguese, by whom it is garrisoned ; and the village of Semah, belonging to the Nawáb of Júnaghúr, is 1½ miles to northward of the fort ; there is a creek running up towards it through marshy ground. From the sea Semah fort appears as a white house, with a ruinous tower adjoining its left side, on which is a flagstaff. It is 1¼ miles W. by S. of Bainsla islet, and is the eastern termination of a range of cliffs 2 miles long; the west extreme of which cliffs forms,

when viewed from the eastward, a remarkable sharp bluff, and is the eastern side of Nowa bunder bay. Nandivéli mountain, the highest east peak of the Girh hills, stands 16½ miles N. ½ W. of Semah fort.

NOWA BUNDER is a small town on the right bank of a creek of the same name, on the west side of a bay, and situated nearly a mile west of Nowa bunder point, which is 4¼ miles W. by S. of Semah fort point. The creek is available for small coasters, towards high-water, and its mouth is protected from west winds by a reef projecting 3 cables' lengths north-east from the point. Horsburgh says, "There is a creek at this place where they haul up their boats, and small vessels may moor in 3 fathoms, under the point, and be sheltered from the S.W. monsoon." Such shelter is not found now. All these little bays, on the east sides of points, which formerly gave some shelter, are gradually filling up owing to the wearing away of the cliffs by the monsoon waves.

Nowa bunder, formerly a nest of pirates, belongs to the Nawáb of Júnaghúr. Some conspicuous brab trees stand 2 miles N.N.W. of the Nowa Bunder cape, and the town of Dáliwála, with a large temple, is 1¼ miles west of them.

The cape is high, bold, and steep-to on its sea face, which is 2 miles long, but a bank of shoal water extends from it half a mile to the eastward.

The Mohamedan seamen of this place and Goglah are descendants of Arabs, who originally settled at Diu; so are also the lascars of Gogah. They are known to be the best and boldest sailors of Hindostan.

DIU HARBOUR is formed on the north-east side of Diu island, by the east cape, which bears from Nowa Bunder point W. by S. ¾ S. 5 miles. Diu fort, or walled town, on this east cape, has a strong wall, flanked by numerous towers on the north and west sides, and protected by steep rocky cliffs on the south or sea face; and having the castle (on which is the flagstaff) occupying its east end.

This castle is separated from the other fortifications by a deep moat cut through the solid sandstone rock, through which the sea had free passage at one time, but at present it only enters at the highest tides.

Diu City, with its numerous churches, monasteries, and such like large buildings, may be seen 10 miles off, and the flagstaff further still; but now Diu is in ruins, though still possessing several good substantial dwelling-houses. The population is about 8,000, of Hindoos, Parsees, and Indo-Portuguese, with a few Europeans, the latter being in Government employ as soldiers and civilians.

Trade is principally carried on with ports in the Mozambique channel, by half a dozen brigs, which make but one voyage during the year, going southward in the fine season, and returning with the S.W. monsoon. The governor has one grab brig and a patimár.

Goglah is a small village, belonging to the Portuguese, on the north side of Diu channel, on a narrow tongue of sandy coast extending from the Nowa Bunder cliffs; to the north and west of this place there is nothing but a swamp for some distance. Another little fort on that sandy isthmus protects Goglah and Diu on the land side.

The inhabitants of Goglah are a hardy race of sailors, who serve in vessels trading with the Mozambique, and in the batélas and kótias of the Katiawár coast. There are also a few families of Arab descent, who, like those of Gogah, furnished sailors for the Indian navy, and for merchant vessels of Bombay.

Supplies.—Diu is a poor place for supplies; no meat, and but few vegetables, are procurable; salt fish and rice are plentiful. Poultry only to be obtained at Goglah.

Water.—Good water is supplied to shipping on application to the governor. This is preserved in excellent but ancient tanks, cut in the solid rock, which are filled every rainy season. There are pipes leading from these tanks to the castle bunder, where vessels of small size may lie, and fill up their water with great expedition.

The passage between the island and Goglah town affords but a narrow channel, which is throughout navigable by small boats; but abreast of Diu town, it has deeper water, about 15 feet at low tide, so that any vessel that can enter at high water can lie at anchor in the stream.

The least depth in the entrance is 6 feet at low water, the rise being 7 feet at highest springs, and 3 feet at neaps.

ANCHORAGE.—Off the fort point, a rocky ledge extends 3 cables' lengths to the E.N.E., slightly protecting the river entrance; and, at the same distance to the north-east of that rocky spit, a small vessel may find anchorage in 4 fathoms, mud. But, in getting to that position, the two following shoals are to be avoided:—

A bank of sand and rock, having 6 feet water, which lies about 3 or 4 cables' lengths E. by S. from the tip of the above rocky spit, or three-quarters of a mile to the eastward of the castle flagstaff.

The other bank, also of rock and sand, lies nearly half a mile E.N.E. of the first bank, and is 3 cables' lengths long, east and west.*

Soundings.—The channel, between the spit and the first bank, has 4 fathoms in its centre; that between the two banks has 4 to 6 fathoms. Soundings in the bay are not regular, nor is the bottom good holding ground, being sand, with here and there a patch of mud, but in places rocky.

---

* *See* Chart:—Diu Harbour, by Whitelock, No. 49; scale $m = 4{\cdot}5$ inches.

TIDES.—It is high water, full and change, at 11 h.: high springs rise 7 feet; ordinary springs 6 feet; neaps 3 feet. The flood stream, outside of Diu, sets E. by N.; greatest velocity at springs 1½ knots, and it often runs 2 hours after high water by the shore. Ebb sets W. by S., 2 knots at springs, and often runs 2½ hours after the water along the shore begins to rise. These irregularities of tides will account in some measure for the eddy currents off Diu head. In the end of January 1836, during two and three days before full moon, the stream, in the offing between Nowa bunder and Diu, ran to the westward, at the rate of less than one knot, for 18 hours consecutively; and the flood was during those two days scarcely perceptible. These facts will account for conflicting statements regarding the real time of high water at Diu.

DIU ISLAND.—Diu island, which belongs to Portugal, seems to have been the earliest permanent settlement of the Portuguese in India; and, by leave of the native sovereign, they built here a factory, which was fortified in 1534. The island is of irregular outline, about 7 miles in length, east and west, and from 2 miles to ½ a mile in breadth. The south face of the island is a sandstone cliff washed by the sea, having deep water close to. Several groves of cocoa-nut trees are scattered over the island. The hills are little more than 100 feet high. Besides Diu town, there are three large villages; one on the west end, called Monakbára; another, on the north side of the hills, called Bachawára; and the southern one, Nagwah, having a little fort commanding a small bay.

Nagwah fort is half a mile within the south point of the above bay, which gives shelter to small vessels from westerly winds, and 4½ miles west of Diu castle; the sea face of Nagwah cliffs is steep-to.

Monakbára fort, commanding the west entrance of the channel round Diu island, stands 2 miles to the west of Nagwah point. This west entrance has as much water as the other, but many scattered rocky patches lie off it. The outer shoal, which has only 9 feet at low water, lies about 1½ miles S.W. by S. from Monakbára fort, forming the eastern danger of Mandwa bay.

DIU HEAD, properly **MANDWA POINT,** (which is the name of the creek in the bay on its east side,) is 2 miles to the south-west of Monakbára, and bears from Diu castle flagstaff W. by S. 9 miles.

This is a bluff rocky headland, forming the south extremity of the Katiawár peninsula; on its highest part, 100 feet above the sea, is a building forming a good landmark, visible 12 miles in clear weather. The point slopes from the building to the eastward, terminating in a small rocky islet, and forms to the north-east a small shallow bay in which the Mandwa creek runs up to Vélum village, 2 miles N.N.W. from the point.

A shoal extends off the point 3 cables' lengths to the east, leaving a clear passage, three-quarters of a mile broad, and with soundings from 8 to 6 fathoms between it and the shoal off Monakbára fort; but a sunken rock lying in the bay must be avoided, which is three-quarters of a mile E.N.E. of Mandwa point.

The Girh hills, 25 miles to the north-eastward of Diu head, are conspicuous; Nandivéli, the eastern peak, before described, bears from Diu head N.E. ½ N. 26 miles. When rounding Diu head, navigators frequently mistake Nandivéli for Júnaghúr hill, a much higher mountain, 40 miles further to the north-west.

ANCHORAGE.—Convenient anchorage for coasters in 4 fathoms water will be found 3 cables' lengths to the west of the sunken rock in Mandwa bay, with the point bearing S.W., and the bungalow at Vélum N.W. by N., which bearing of the bungalow will lead a vessel clear into the bay.

Diu head is steep-to, and may be approached quite close; but, to the eastward, has the above-mentioned shoals off Mandwa bay; and, at 1½ miles to the westward of the building on the head, there is the eastern end of a rocky shoal, 7 miles in length, lying more than one mile off shore and having patches of 3 fathoms on it; this shoal should not be approached on the south-west within a depth of 12 fathoms.

TIDES.—Mandwa creek is dry in the entrance at low water. It is high water, full and change, at 10 h. 45 m.; spring tides rise 7 feet; neaps 3 feet. The country at the back of Diu head is swampy and much overflowed by high spring tides. Off Diu head the stream of flood frequently runs, at full and change, till 1 h. 45 m.; or 3 hours after high water on shore. South of the cape the flood sets East, and ebb W.S.W. 1½ to 2 knots an hour; but the stream of tide is very irregular, as the ebb from the Gulf of Cambay, and the flood from the west coast of Katiawár meet here, causing frequently strong eddies a few miles south of the cape.

CHAPTER VIII.

KATIAWÁR AND OKHA-MUNDEL COASTS.—DIU HEAD TO BATE ISLAND.

Variation, from 0° 10′ West to 0° 15′ East in 1865.

The WEST COAST of KATIAWAR, from Diu head to the entrance of the Gulf of Kutch, is 160 miles in length. The southern 10 miles is under the dominion of the Gaikwar of Baróda. The next 45 miles, between M'hul Dwarka and Seel bunder, is under the Nawáb of Junaghúr. From Mahádeopore to Miáni belongs to the Rána of Porbunder. The 22 miles from Miáni to the Runn at Mudhi, form part of Halár, the territory of the Jam of Nowa-nugga, to whom belongs the south side of the Gulf of Kutch. The northernmost 30 miles, called Okha-mundel, under the Gaikwa of Baróda, is almost severed from the main by the Runn, a mud flat, submerged in the rainy season, between Mudhi and the Gulf of Kutch.

The Katiawár coast is in general low, with a high sandy ridge fronting the sea.* The country is generally well cultivated with cotton, sugar-cane, and various kinds of grain and herbs. The towns and villages are numerous, and many are walled and flanked with round bastions. There are few hills visible along the coast.

The Girh range, averaging 1,000 feet in height, is not visible any distance off the west coast, though Nandivéli, its east peak, 1,847 feet above the sea, is so good a landmark for the south coast.

Junaghúr mountain, or Girnár, 35 miles inland, is of a conical form ; its summit, which is notched with two or three small peaks, and thus rendered remarkable, is elevated 3,837 feet above the sea, and may be seen in clear weather from a distance of 60 miles, or all along the coast from Diu head to Porbunder, until a vessel passes to the north of the latter place, when it disappears behind the Birda range. It is described as an immense bare and isolated granite rock, presenting all the gigantic masses peculiar to that formation. On it there are numerous temples and monastic establishments of the Jains, which are amongst the most interesting architectural works in India.

The Birda hills, being from 12 to 18 miles inland, are very conspicuous, and visible from 25 to 30 miles off. When viewed from the northward

---

* *See* Chart :—India West Coast, Gulf of Kutch to Viziadroog, No. 2,736; scale, $m = 0{\cdot}09$ of an inch.

they are seen in three distinct peaks; the left-hand one, called Vénu, is highest, being 1,730 feet above the sea. As you go southward to Porbunder these peaks come together, and off Navibunder the highest peak is seen on the right-hand side of the range.

Water is only procurable in any quantity at Veráwal, which is also the best port to obtain fire-wood, as it is near the hills, where the wood is cut, and consequently cheaper than elsewhere.

The Katiawár coast is safe throughout its whole length. The currents if any, set along the line of coast, so that a vessel may run along at any distance; but, at night, a line of about 20 fathoms would be near enough.

DIU HEAD, called **MANDWA** by the natives, is a bluff rocky headland, having an old building on the top of the cape 104 feet above the sea level, and forms the southern extremity of the province of Katiawár. The point slopes to the east, terminating in a small rocky islet, and forms a small shallow bay with a creek running up to the village of Vélum.

The point is quite safe to approach within one mile, the soundings decreasing very gradually to 12 fathoms at that distance, all mud. The country is generally low, with an extensive salt swamp at the back of Diu head. The Girh hills may be seen to the northward in clear weather, and a remarkable long rounded hill, called Nandivéli, about 25 miles to N.N.E.

Mandwa bay gives shelter to small craft from north-west winds, but boats may conveniently land in a little bay 1½ miles west of the building on Diu head, opposite a clump of palm trees.

North-west winds are by no means frequent on the Katiawár coast, nor do they cause a heavy surf; but landing is rendered difficult and dangerous when a long heavy ocean swell occasionally rolls in from the southward; at such times landing in Mandwa bay is scarcely practicable.

SHOAL BANK.—From 1½ miles west of Diu head, a rocky shoal, 7 miles long, extends to within 2½ miles of M'hul Dwarka, varying in breadth from half to three-quarters of a mile, and distant from the shore 1 to 1½ miles.

The soundings on it range from 7 to 2 fathoms, all rock, with 10 and 11 fathoms, mud, inside. The least water found on it was 2 fathoms, and no vessel should approach it within 12 fathoms, which is about a mile from the southern edge. The building on Diu head bearing E. by N. will lead a ship clear to the southward. M'hul Dwarka N. by W. ½ W. clears to the westward of it; and with a remarkable clump of low cocoa-nut trees bearing North, a vessel is clear to the eastward of the shoal.

M'HUL DWARKA bears W.N.W. 10¼ miles from Diu head, the intervening coast forming rocky points with sandy bays between, and about midway are cliffs of 30 to 40 feet elevation. M'hul Dwarka, or the *original Dwarka*, (from a tradition which the natives have that the celebrated temple of that name once stood there, but is now submerged in the sea,) is a small bluff point with an old temple on its summit, 78 feet above the sea level, and, though scarcely distinguishable from other similar clumps along the coast, may be known by the white sand on the top of the cliffs and the dark building of the temple; there is a single brab tree a short distance to the north-west.

There is a good landing place for boats on the south-east side of the headland on which the temple is. About half a mile east of M'hul Dwarka the Singóra river falls into the sea, but it has very little water in it except during the rains. There is also a large salt creek, called the Sómad or Soomat, about 1½ miles to the W.N.W.

The town of Korinár, or Kolinár, is just visible amongst some trees, 3 miles to north-east of M'hul Dwarka; and a white tomb, called Chára, stands close to the sea 2 miles to E.S.E. The village of Chára, to the east of the tomb, has larger and thicker trees than elsewhere. M'hul Dwarka, and the coast to the eastward as far as Diu is under the dominion of the Gaikwar; but westward as far as Seelbunder, under the Nawáb of Junaghúr.

TIDES.—It is high water, at full and change, about 10½ hours, with a rise and fall of 7 feet. Ebb sets W.N.W. and flood E.S.E. about 1 to 1½ knots per hour, but subject to irregularities and checks from prevailing currents. In December and January, when the current was setting up the coast, the ebb often ran for 12 hours at a time, remaining slack during the time of flood generally, but with a slight set to the eastward occasionally.

SUTRAPÁRA, 11 miles W.N.W. from M'hul Dwarka, is a small bay affording good anchorage for coasting craft, being protected by a spit on either side, and the bunder is a good landing place for boats. On the north side of the bay the cliffs are about 50 feet high, and on its south side the sand-hills are high. The shore reef projects a little off the south point, on which are 2 large rocks visible a good way off. On the shore of the bay there are the remains of an old fort, and a new house, close by which there is a sulphurous spring of water; about three-quarters of a mile inland stands the town of Sutrapára. The coast between this and M'hul Dwarka is low and sandy, with patches of cliffs at intervals. Two tall brab trees, amongst other trees, mark the site of the village of Daumlej, rather a large town, situated 1½ miles inland; and to the west of this there is a single tree near the coast, very conspicuous.

Soundings.—The soundings are regular over a muddy bottom till within one mile of the shore, where it becomes rocky. The depth is 12 fathoms at 2 miles off, 15 at 5 miles, and 20 about 10 miles off.

VERÁWAL, or **VELÁWAL,** bearing N.W. by W. $\frac{1}{4}$ W. $8\frac{1}{2}$ miles from Sutrapára, is a large and populous town, carrying on a considerable trade with Maskat, Karáchi, and Bombay. The boat anchorage is partially protected from N.W. winds by a rocky spit running off from the outer bastion of the town, but the bottom is rocky inside of 11 fathoms, and does not afford good holding ground.

Supplies.—Water and wood are cheap and plentiful at Veráwal; the former being easily obtained from a well on the shore of the sandy bay, just to east of the town. Rice and good poultry are procurable, but scarcely any sheep, owing to the influence which the Banyas, who wish to preserve animal life, exercise over the villagers.

Somnáth Temple.—Two miles to E.S.E. of Veráwal may be seen the once famed temple of "*Somnáth,*" situated close within the sea wall of the ancient town of Puttun. It is now desecrated and defiled, and is scarcely distinguishable from the mass of ruins which surround it, but still retains some traces of its original beauty. Puttun is surrounded by a wall and the remains of a moat, which in early days used to be filled from the sea. The sea face of the wall, close within which the remains of the temple of Somnáth stand, is in course of demolition by the sea during the S.W. monsoon. Two streams conjointly discharge themselves into the sea about half a mile east of Puttun, the Heeran and the Saraswáti, both held in great sanctity by the Hindoos.

ANCHORAGE.—Midway between the two towns of Puttun and Veráwal stands the modern temple of Veervanjan, with a spire about 60 feet high, which may be seen 10 to 12 miles off. A good anchorage is with this bearing N.E. by E. about $1\frac{1}{2}$ miles distant, in 11 fathoms, mud.

The coast eastward of Veráwal is low and sandy for 4 or 5 miles, then rises to rocky cliffs of 40 to 50 feet elevation, within $1\frac{1}{2}$ miles of Sutrapára. At the commencement of the rocks there is a small boat anchorage and village called Heerakót, once the stronghold of the Gúzerát pirates; the ruins of their forts still exist.

MANDAR, the bunder of Chorwar, bears N.W. by W. 10 miles from Veráwal. This is a small anchorage, with an old tower, and a modern storehouse close to the beach, which is called Choorwar in the old charts, but the town of that name is $1\frac{1}{2}$ miles to the northward of the bunder. A fine stream, called the Kaumba, pours its waters into the sea during the S.W. monsoon, about half a mile to the eastward; but, like most of the rivers on this coast, its mouth is generally dammed up with sand during the fine season, and the water near the sea quite salt.

The coast eastward of Mandar is generally sandy, with low cliffs here and there, and the bottom below low water mark very rocky, which renders landing difficult. Four miles south-east of Chorwar is the walled town of Andri, known by its many towers, on which are white flags, amongst thick trees.

From Mandar to Sutrapára the coast is quite clear, and safe to within one mile of the shore; the bottom is mud, and mud and shells, till you come to the rocky bank which fringes the coast everywhere to the distance of a mile. Between Mandar and Mangaról the landing is difficult, as it is very rocky.

MANGARÓL BUNDER, bearing N.W. ½ W. 10 miles from Mandar, is another small anchorage for boats, formed by a ledge of flat rock which has been cut away on the inside so as to form a wharf, alongside of which boats lie and take in their cargoes; but it is open to all except N.W. and N.E. winds, and will not admit more than three or four Kótias, or native vessels, at a time.

The town of Mangaról is 1¼ miles N.E. from the bunder, and is conspicuous from a distance of 10 to 12 miles by a high tower connected with the Chief's house. Near this place there is much cultivation and trees, and some fine old Mohamedan tombs amongst banyan trees. The fishermen at the bunder village are Hindoos, but at Mangaról the inhabitants are chiefly Mohamedans.

From Mangaról the line of coast runs N.W. ¼ N. to Navibunder, a distance of 27 miles. The soundings regular, over a muddy bottom, but rocky from 1 to 1½ miles off shore; at 2 miles off, 11 fathoms, mud; at 5 miles off, 14 to 15 fathoms; and 18 to 19 fathoms at 10 miles off.

TIDES.—About this place the streams of tide are not perceptible. High water at the bunder about 10 h. 30 m. at full and change; rise and fall 7 feet at springs, and 3 or 4 feet at neaps.

SEEL BUNDER, 5½ miles to the north-west of Mangaról, has a good creek, with plenty of water in it for native vessels of any size, but the mouth is only open during rains. On the south point of the creek is a newly built square tower on a high sandy mound. The town of Seel is about a mile within the creek, on the south bank. A single brab tree rises out of a copse of trees at the village of Mérunsa, to the south-east of Seel new tower.

The natives are extremely desirous of making Seel creek navigable during the fair season, and have undertaken some works for that purpose during this year (1853–54); but as the effect of the S.W. monsoon is rather doubtful, they will not incur further expense till that has been proved.

MAHÁDEOPORE, or Mádupore, is a walled town standing close on the beach, about 7 miles to the north-west of Seel. The beach is steep and sandy, and landing is difficult on account of surf. This fort or walled town is small and square, with round towers at the corners. Behind Mahádeopore are some curious caves, and the sand-hills to south-east of it are high. Here commences the territory of the Rána of Porbunder.

NAVIBUNDER is another walled town, 15 miles north-west of Mahádeopore, close to the sea, with a good creek formed by the junction of the Bhadar and another small river. It washes the northern wall of the town, and falls into the sea half a mile to the N.W., but the mouth is shallow and rocky, and difficult of access. This is, however, said to be the largest river on the west coast of Katiawár.

The coast about Navi consists of sand-hills, with occasionally a little rock on the beach, the surf always heavy. Several villages, known by patches of trees, line the shore. Between Navibunder and Porbunder the coast trends N.W. ½ N., fronted with sand-hills, at the back of which is an extensive swamp, extending in the rainy season from the one place to the other, but in the fine season confined to the vicinity of Gósa, a village between Navi and Tunkra, from which it derives its name of Gósa-ka-bára. In the cool season vast numbers of waterfowl are seen on its banks.

This coast is all sandy, with a rocky bank extending 1½ miles off. Outside of that you have 10 fathoms, mud, gradually deepening off into 15 fathoms at 6 miles.

TUNKRA TEMPLE, standing a quarter of a mile to the north-west of a village of that name, is 6 miles N.W. from Navibunder. The mouth of that extensive swamp or backwater, during the rains, is about one mile to the northward of this temple.

PORBUNDER, the largest town on the coast, and a place of considerable trade, bears N.W. from Tunkra temple 9½ miles. The town is within the fort, the walls of which are 1½ miles in circumference. The landing place is opposite the south-west bastion, in which is the flagstaff, which hoists the white flag of the town.

The Rána of Porbunder possesses the district of Birda, or Jaitwár, the sea coast of which lies between Mahádeopore and Miáni. He is of the Jaitwa tribe of Rajpúts, and subordinate to the Gaikwa of Baróda, to whom he pays tribute, as well as to the British Government, which also receives a share of the customs duties of Porbunder, ceded to the late E. I. Company in 1809, for the maintenance of a small military force at Porbunder.

The Birda Hills, from 10 to 18 miles to the north-east of Por-

bunder, are visible a long way off, in clear weather 25 miles from the coast. The highest peak is said to be 1,730 feet above the sea. Junaghúr mountain, or Geernár, 3,837 feet above the sea, is plainly visible in clear weather from Porbunder, but in going northward a ship loses sight of it as it disappears behind the Birda hills.

ANCHORAGE.—The coasting craft anchor 2 to 3 cables' lengths to the west of the town and are a little sheltered from north-west winds, this boat anchorage being slightly protected by a rocky spit to the N.W.; but the bottom, inside of 9 fathoms, is more or less rocky and very bad holding ground. Large vessels must anchor nearly 2 miles from the fort in 9 fathoms, mud, with flagstaff on with northern Birda peak. The creek opens at the N.W. angle of the town, in a very narrow rocky mouth, with only 1½ feet at low water springs, deepening to 9 feet under the town walls at the jetty.

TIDES.—High water at full and change 9 h. 45 m.: rise and fall 6 feet at ordinary springs. The tide in the creek runs from 1½ to 2 knots per hour. In the offing the tides are not perceptible; high water occurs here earlier than on any other part of the coast; the flood stream diverges hence to north and south.

MIÁNI BUNDER, bearing N.W. 17 miles from Porbunder, is a little village with a small fort, on the south bank of a considerable creek, called Burtu or Vurtu, which has about 9 feet at high water in its mouth. The Pagoda, so called, is an old Hindoo temple, called Hersad Máta, situated on a hill about 180 feet high on the north side of the creek, on which is the bunder of Miáni; the creek can only be entered at high water, the bar and all inside being dry at low water. Off Miáni it is perceptible that the flood tide sets northward. Between Porbunder and Miáni the soundings are rocky to 10 and 11 fathoms 2 miles off shore, increasing to 15 fathoms, mud, at 5 miles, and 20 fathoms at 10 miles. The coast is low, rising gradually to the hills at Miáni.

Proceeding to the northward the water becomes deeper and the bottom rocky, with mud intermixed; the soundings are 15 fathoms at 2 miles off, 20 about 5 miles off, and 22 at 8 miles off.

The coast from Miáni to Mudhi runs N.W. ¼ N. 22 miles, forming a high sandy ridge, broken here and there, in gaps; the only remarkable objects being two small conical hills 3 miles to the south-east of Mudhi fort, and just halfway between Miáni and Dwarka. The shore is throughout a high sandy beach by high water mark, but paved with flat rock below that.

MUDHI, or **MURRI,** 12 miles south-east of Dwarka, is a little hamlet with a small dark temple and old tower, standing on an elevated rocky

piece of land. To the north, between it and Dhráwa, is the Runn, which extends from the gulf of Kutch, and is overflowed in the S.W. monsoon, when it separates Katiawár from Okha-mundel by only a narrow strip of sand, 200 yards wide, covered with cactus bush and coarse grass.

PENINSULA of OKHA-MUNDEL.—This district (the western shore of which, from Mudhi to Okha point, is 30 miles in length) is under the Kamávisdár of Dwarka, who is appointed by the Gaikwa of Baróda. At high water of spring tides and in the S.W. monsoon it is very nearly insulated by the submergence of the Runn, a salt marsh that extends from Mudhi a dozen miles to the north-east into the bay between Pindára and Poshetra, villages on the shores of the Gulf of Kutch. Salt is left on it by the receding tide, which the natives are permitted to collect without any tax.

Okha is very low, the substratum being sandstone. The soil is very poor, and only cultivated around the villages; bájri and til are the only grains that thrive; the agriculturist depends on the S.W. monsoon for his supply of water, wells being very scarce. The prickly pear grows profusely all over the peninsula, and, interspersed with the bábul or leafless thorn, they form thick jungles, where thieves and outlaws until lately hid themselves. The conch shell, called by the natives *chank*, is found of large size and in great quantities on the shoals along the northern shore and around Bate island (hence sometimes styled Chankudhúr), and is an article of commerce, as in the Gulf of Manár.

But for the great temples of Dwarka and Bate, the Okha district would be utterly unimportant. The appearance of the coast from sea is as follows:—sand-hills for 10 miles fro[redacted] to Dwarka, cliffs from that place for 7 miles to Kutchigud, then sand-hills for 12 miles to its northern extreme. Besides Bate harbour on the west of that island, good anchorage is available in deep water with muddy bottom off the east extreme of the island, and also to the eastward of Poshetra (*see* page 220).

The inhabitants of Okha-mundel are called Wadhel-Rajpúts and Waghers; the latter being the people who have so often resisted the local authorities of this province. The origin of these tribes is lost in obscurity; by some they are supposed to be aborigines of the soil. Their habits now are much the same as described by the Greeks 2,000 years ago, the use of fire-arms excepted. The natives have, for the most part, lived at the expense of the thousands of pilgrims which come from all parts of Hindostán to Dwarka and Bate, and, till lately, by plunder both by sea and land. Camels of a small species are bred here for sale in Katiawár.

Wachu, a village with a large round tree, nearly 5 miles eastward of Dwarka, is conspicuous. Between this village and Dhráwa, there is a fresh-water stream called Okha-nadi, which during the rainy season bursts into the sea. There are many such along the Katiawár coast, and at their mouths there is found a gap in the coral reef which fringes the coast, thus furnishing a good landing place, where small boats can lie aground in the mud, as they do at Okha-nadi, and load with firewood. These periodical outbursts of fresh water are evidently antagonistic to the growth of coral.

DWARKA TEMPLE, also called Juggat, and Goomti, is a shrine of very great sanctity, and resorted to by thousands of pilgrims from all parts of India. It is within Dwarka fort, which is built on an eminence rising from the sea shore and encloses the town, from which, however, the temple is separated by a lofty partition wall. The structure is of carved stone, with figures from the base to the summit, and white-washed all over, a very conspicuous landmark. It is elevated above the sea level 168 feet, and visible at a distance of 17 or 18 miles in clear weather. A little to the westward of it, close to the edge of the cliffs, a column commemorates the capture of the place by the British under Colonel the Honourable Lincoln Stanhope on the 26th November 1820. There are several small temples between this column and the fort. The Goomti (by which name the temple is sometimes called) is merely a stream that drains the country in the rainy season; at low tides its mouth is closed, though the sea washes the south side of the fort at high water.

The landing place is on the steep sandy beach between the cliffs and the mouth of the Goomti, by an old dark temple washed by the sea at high tide. But with any southerly swell there is here too much surf, and boats should then go into Rúpon [redacted]

Rúpon Bunder, the port of Dwarka, 1½ miles to the north of Dwarka point, is marked by a square flat-topped house on a sandy neck of land, on the north side of a creek. The small country vessels which visit it lie aground at low water on a fine sandy beach where the water is smooth, as the sea breaks on the fringing reef half a mile to the westward. The force which invested Dwarka in November 1859 was conveniently landed here from the steamers and ships.

The cliffs which commence at Dwarka are about 40 feet high, covered with cactus bushes, and terminate about 1¼ miles to the northward, at Rúpon creek, which is shallow and much obstructed by rocks at the entrance.

ANCHORAGE.—For large vessels the best anchorage is in 11 to 12 fathoms, sand, with Dwarka temple E.N.E. distant 1½ miles, but holding ground is bad hereabouts, and towards the entrance of the gulf; the surveying vessels lost several anchors. The flood tide sets to the northward

TIDES.—It is high water, full and change, at Rúpon at 10 h. 30 m.; high springs rise 11 feet, ordinarily 10 feet; neaps 6 or 7 feet. Off this place the flood sets to North, sometimes more than 2 miles an hour, and the ebb to S.S.E. about the same strength. As the vessel goes northward, the tides increase in velocity, rendering navigation difficult.

Beerwála, or Veerwára, is a large walled town standing between Dwarka and Kutchigud. A square tower in it is a good mark, and visible several miles from seaward.

KUTCHIGUD, a small fort at the bottom of a shallow bay which is open to the north-west, bears from Dwarka about N. by W., 5½ miles. The intermediate shore is rocky, fringed with a coral reef, extending about a quarter of a mile off. The soundings are all coral, or hard rock; 10 fathoms is the depth at one mile off shore, and 16 to 20 fathoms at two miles. Between 2 and 3 miles to the north-east of Kutchigud, there is a sand-hill with bushes on it, less than 100 feet above the sea, though represented as much higher on the charts. There is a good landing place on the sandy beach in the Kutchigud bay to north of the fort, protected much by a fringing coral reef to the westward; this beach is frequented by turtle.

Kutchigud, with a little strip of land round it, belongs to the Ráo of Kutch: it was formerly one of the haunts of the notorious pirates, spoken of in old accounts as Sanganians, or Sangadians, who had a fort, which is now in ruins, on the extreme point of land half a mile west of Kutchigud fort. A former Ráo of Kutch built Kutchigud fort to protect the trading vessels of his own subjects from those pirates.

From Kutchigud the coast trends away N. by E., gradually rounding to N.E. by E. towards Bate, with a dangerous rocky reef extending from 2 to 2½ miles off shore; and outside of this, leaving a fair channel 3 to 4 miles wide, lies the Gurúr shoal.

CHORA SAND-HILLS stand along the sea-shore 5 or 6 miles N.N.E. of Kutchigud, and the same distance to south-west of Vománi point, and off them the foul ground extends 2 miles.

Arámra is a fort 7½ miles N.E. by N. from Kutchigud, and standing 2 miles at the back of the Chora sand-hills; it is on the south-west shore of Bate harbour, and between the two places there is a ferry.

VOMÁNI POINT, the northern extreme of Okha-mundel, is a little conical mound, elevated about 25 feet above high water, and situated one mile from the south-west end of Sainia island; a shelving coral reef dries off it halfway to the island.

Okha Point, which is rather more than one mile eastward of Vománi, and about half a mile south of Sainia island, forms the western shore of Bate

harbour. It is a level sandy point with bushes a few yards from high-water mark.

SAINIA ISLAND has a little tomb called Sainia Pir in the centre of the island, 40 feet above high water level, which is the most useful mark hereabouts, and may be seen 9 or 10 miles from a ship's deck.

GURÚR SHOAL, of sand and rock, on which there are various depths of water, from 10 to 3½ fathoms, extends over a length of 10 miles, north-east and south-west, and has a sandy knoll, called Béka, just dry at lowest water of spring tides, on the north-east end, 5 miles from the main land; Bate cocoa-nut trees just to the right of Sainia Pir, bearing S.E. ½ S., mark this little patch which dries.

The depth between the Gurúr shoal and the shore reef varies from 12 to 20 fathoms; the bottom is sand and shells. The southern and western parts of the Gurúr are free from danger; but to avoid all risk do not bring Dwarka temple inside Kutchigud fort, or to the southward of S. by E. The south end of Gurúr shoal is connected with the shoal water off Chora sand-hills by a shallow neck, having 10 fathoms water, with much deeper water on either side; but, as these overfalls are so deceiving, ships had better pass to seaward of the Gurúr.

Between the Gurúr shoal and the main, during a calm, on the ebb tide, the sea sometimes breaks even in deep water; and on both tides there are heavy ripplings, causing alarm to a stranger. When standing in towards the Gurúr, the change in the colour of the water, the ripplings, and great quantities of seaweed in large patches drifting on the surface, would sufficiently point it out by day. But the soundings are a sure guide; the 20 fathoms line is decidedly marked; and the water will, when the flood tide accelerates the vessel's speed, generally shoal 10 fathoms at a cast. In westerly winds there is a hollow breaking swell on the Gurúr.

By night a ship not bound into the Gulf of Kutch, should not shoal under 20 fathoms, off its mouth, as the following bank lies to the north-west of the Gurúr.

LUSHINGTON SHOAL, called Unnia Mor by the Kutch boatmen, is a shoal patch of sand and rock, the former doubtless brought by the currents from the coasts of Sindh and Kutch, and deposited on the rocky nucleus, where the ebb from the gulf of Kutch conflicts with the south-easterly ocean current of the S.W. monsoon. It is supposed to be getting shoaler gradually; 3½ fathoms at low water was the least found in 1850, but there may be a less depth on it. The soundings near it vary, from 15 to 16 fathoms at 2 miles to the south, and from 20 to 30 between it and Gurúr, from which it is distant 11 miles. A cast of 5 fathoms was found

at 4 miles to the south-west of Lushington shoal, in which direction a 10-fathom bank extends 16 miles. Shoal patches of 8 fathoms lie to the west of it; from 10 to 11 fathoms is the depth on its north-west side, from whence the water gradually shoals to the Kutch coast. To the eastward, between it and Ranwára shoal, there is a deep gut with from 30 to 35 fathoms.

This 3½-fathom patch is in latitude 22° 37′ 40″ N., and longitude 68° 48′ E. From it Nanáo hill, in Kutch, bears N.E. ½ N. 46 miles, and is visible in clear weather; Béka shoal bears E.S.E. 13 miles; and Dwarka temple S.S.E. 25 miles.

The TIDES on Lushington shoal set E. by N. and W. by S. 1½ to 2½ knots per hour. High water, full and change, at 11 h. 30 m., when the ordinary rise is 10 feet.

MOUTH of the GULF of KUTCH.—For a steamer, or a ship with a fair wind, bound into the Gulf of Kutch, the passage between the Gurúr and the mainland of Okha-mundel should be used, care being taken that, in giving that shoal a wide berth, the vessel does not go too near the spit off Sainia; the fair channel is 3 miles wide. From Dwarka the tides make strong in and out of the gulf of Kutch, setting with the line of coast, 2 to 3 knots per hour, increasing to 3 and 4 as you approach Bate.

Vessels bound to Mandavee from the southward, passing between Gurúr and Lushington shoals, should keep Dwarka temple and Kutchigud fort in one, or bearing S. by E. so long as either can be seen from aloft on that line. Assar Pagoda, on the Kutch coast, should be steered for, and will bear about N.E., 20 miles distant from outside the Gurúr.

To the north of the Gurúr, between Lushington and Ranwára shoals, there is a gut of small extent, having over 30 fathoms water; from this deep basin, which is a good guide to know a vessel's position, on a fine day Nanáo hill in Kutch may be seen bearing N.E. by N., and all will be clear before you; but due care must be taken to allow for the tides, which set east and west in the mouth of the gulf, about 3 miles per hour. The above bearing of Nanáo hill leads clear in mid-channel between Lushington and Gurúr shoals. A steamer may conveniently pass between the Gurúr shoal and the coast of Okha-mundel, when bound to Mandavee in the daytime, and, by taking a fresh departure from Sainia island, will not only make more certain of steering straight for Assar pagoda on the Kutch coast, but will save several miles.

DIRECTIONS for entering BATE HARBOUR.—For vessels bound into Bate from the Katiawár coast, the following directions are given, but the harbour will be more fully described in the Gulf of Kutch.

There are several channels into Bate * at high water; but, for steamers,

* *See* Chart, Bate Harbour, by Taylor, No. 47; scale, *m* = 2 inches.

the passage round the east side of Sainia island is preferred, as the rocky point of its reef shows itself so plainly, and a vessel should pass quite close to it. There is no flood tide felt in this passage, though north of it, across its mouth, the flood stream runs 3 or 4 knots to the eastward, and the ebb to north-west.

A sandy spit extends for a mile to the north-west of Sainia island. Bate fort, 2¼ miles S.S.E. from Sainia Pir, was destroyed in 1859, but its site is visible, being about 60 feet above the sea. The cocoa-nut trees standing one mile north-east of the fort are a good landmark.

Béka shoal, the north-east end of the Gurúr, which has a little sandy knoll, dry at lowest spring tides, is marked by Sainia tomb just to the left of Bate cocoa-nut trees. Therefore, when the trees are seen clear to the *left* of all Sainia island (seen best from aloft) the ship is well clear to the eastward of the Gurúr shoal, and should stand onwards to S.E., allowing for tide, if bound into Bate, with those marks becoming a little more open, till Chinri sand bears East, when she may gradually open out the whole of Bate island to the left or eastward of Sainia island.

To enter the passage along the east side of Sainia.—Having arrived (as above) within a mile to the northward of the island, keep a look out for the north-east tip of its reef, and steer for it S.S.W., paying great attention to the tide, which rushes past the tip of the rocks with great velocity. Two sandy points of the Okha shore, between Sainia and Arámra, will be seen in line ahead, keeping these in a line will lead you in clear to the eastward of Sainia reef, which is only partially covered at high water; steer S.S.W. along the east side of the island, not opening out the sandy points till the south end of Sainia bears W.N.W.,* when you may go a little further southward, and anchor 2 or 3 cables to the eastward of the first sandy point, which is Okha point, in 5 to 7 fathoms, with Vománi point bearing West.

With a commanding Northerly wind, sailing vessels might enter the above passage as well as steamers.

With a Westerly wind a ship must wait till half flood, and then cross Bate bar, with the east sandy point of Okha-mundel on with Bate fort; in this passage she will have more than 4 fathoms towards high water; and, when in the deep water (with Sainia Pir bearing East), where it breaks even in 10 fathoms when the tide is running to windward, she must borrow towards the south end of that island, and, when up to it, haul to the southward, and anchor to the east of Okha sandy point, with Vománi mound bearing West, as before.

* *See* page 220, for further directions concerning Bate.

CHAPTER IX.

THE GULF OF KUTCH.

Variation of Compass at the entrance 0° 26′ East, and at the east end 1° 30′ East, in 1865.

THE Gulf of Kutch has been hitherto looked upon as a dangerous place for a vessel to get into; but is now known to possess some harbours and anchorages already affording shelter, whilst many others possess natural advantages which may ultimately claim for them the notice of English merchants, desirous of procuring cotton from the north side of the Katiawár peninsula.

GENERAL DESCRIPTION.—Kutch, in its greatest length from east to west, including the Runn, is about 175 geographical miles; and its breadth, north and south, is about 90 miles. Its sea-coast has a navigable length of 120 miles. The Runn, which connects it with Sindh on the north, and with Gúzerát on the east, is the remarkable feature of the country; it is for half the year a sandy desert; and for the other half, a muddy inland sea, the waters of the gulf on the one hand being propelled over it by the S.W. monsoon, whilst from the east and north come simultaneously the freshets from several swollen streams; then it is impassable, except by flat-bottomed boats. On the waters receding, it is encrusted with salt, in some places an inch deep, and beautifully crystallized.

Earthquakes are sometimes experienced in Kutch. In July 1819, one of these convulsions of nature, near Lukput, caused the upheaval of the Allah Band, an enormous mound of earth and sand, many miles in extent, and simultaneously, the submersion of an adjacent tract of country. Kutch receives comparatively but little rain. There are no permanent rivers in the province; but, in the S.W. monsoon, numerous torrents descend from the mountains, both in a northerly and southerly direction; yet, in the N.E. monsoon, all that is seen of them along the sea coast is their dry beds. Wells, however, are abundant.

There is a scarcity of timber both on the hills and in the plains; the former are covered with low brushwood. Plantations of pipul and bábul trees surround most of the villages; the dwarf date tree is common, but of little use. Cotton is the principal commercial crop; sugar-cane, joári

(maize), bájri (millet), and the common grains of India are cultivated ; its grape and musk-melon are excellent.

The horses of Kutch are held in estimation ; kine are abundant and good, though not equal to those of Gúzerát ; sheep are scarce, goat-mutton being used by Múselmín and by those Hindoos who eat meat ; buffaloes and camels are also abundant, and thrive on that luxuriant pasturage, called the Bunni, which fringes the northern frontier. The wild ass roams over that desolate tract the Runn, and the nil-ghâo and antelope are found on its borders. In the cold season, the N.E. monsoon, water-fowl are numerous, and several species of crane, one of which, the kúnj or kalam, goes about in large flocks, and they are very destructive to the ripening grain.

The coasts of the gulf are uniformly low ; the northern shore consisting of sand and mud, whilst the southern one is fronted with islands, which are covered with brushwood, and surrounded by coral reefs.

The Kutch hills, the Lunkhi range, which are 15 to 20 miles from the sea, stand east and west for about 30 miles, nearly parallel with the shore line. At the back of them, and 36 statute miles to the north-east of Mandavee, stands Bhooj, the chief town in Kutch, which has a very picturesque hill-fort, though it is not visible from the shores of the gulf.

These hills, with the exception of Nanáo, have no remarkable peaks or features by which they may be recognized. The highest eastern hill, called Katrúra, 21 miles to the northward of Moondra, is 1,000 feet above the sea, of a round form, and may be seen from off the Halár coast, that is, the south side of the gulf, in clear weather.

Navigation.—In the N.E. monsoon, a vessel, working into this gulf, will keep along the northern shore ; and, going out of the gulf with Westerly winds, should work to windward along the southern coast, taking advantage of the sheltered anchorages on the east sides of the several reefs; therefore the following description of the Gulf of Kutch goes *eastward* along the north shore, and *westward* along the south shore.

ASSAR PAGODA, about 23 miles N.N.E. of Sainia island, and 7 miles westward of Mandavee, may be called the northern boundary of the gulf ; and it is in the direct line between Sainia island, the southern boundary of the gulf, and Nanáo hill in Kutch, the principal landmark in that province.

Assar is a Mahomedan tomb, situated on the crest of the sand-hills close to the sea ; its dome is at an elevation of 113 feet, and may be seen 12 miles off. To the south-west of this place, rocky ground extends 3 miles, with overfalls from 9 to 3 fathoms ; and it should not be approached within 3½ miles ; the Mandavee light should not be brought to bear to the southward of E. by N.

Vessels bound to Mandavee should make this coast with Nanáo hill in

a line with or to the left of Assar, bearing about N.N.E., that being the mark for clearing the west end of Ranwára shoals, which have patches of 3 and 5 fathoms, rocky ground, at the distance of 6 and 7 miles to the southward of Assar. Mandavee light may be steered for when bearing E.N.E., but should be kept on the port bow, as the anchorage for large ships is 2½ miles south of it.

The coast between Assar and Mandavee is fronted with fine white sand-hills, which at night are very conspicuous.*

MIR TAMÁSHA, another tomb, stands midway from Assar to Mandavee, and is 100 feet above the sea ; the little creek to the east abruptly terminates the high sand hill of Mir Tamásha, thus forming a steep sandy bluff, which on moonlight nights is seen as soon as Mandavee light.

RANWÁRA SHOAL.—From the shoalest part of Ranwára, or N'wára, Mandavee lighthouse bears from North to N. by E., and is 7¼ miles off. This patch, on which are always heavy breakers, is about 1½ miles long, east and west, and about half a mile broad ; the bottom sand, shells, and rock ; and least water 2 feet.

The foul ground of Ranwára covers an extent of 10 miles, from east to west, and no ship should approach Mandavee from seaward when the light bears between N.E. by E. and N. by W., until she is inside the Ranwára. In the daytime, the tomb called Rawul Pir, 2 miles eastward of Mandavee fort, when *on with* Nanáo hill, is a safe mark for clearing the east end of Ranwára shoals.

KUTCH MANDAVEE, the most important commercial town in the Gulf, situated nearly 3½ miles to the eastward of Mir Tamásha, is a large walled town, of nearly square form, flanked with bastions, and was in its day a strong place. The south-west bastion is highest, and on it the light-house is built, about 20 feet above the parapet, and 83 feet above high water mark. The Ráo's palace (no longer used as such, but considerately given up by His Highness the Ráo, as a rest-house for British officers and their families), a large flat-roofed building, and a more conspicuous land-mark than the lighthouse, stands about 100 yards to the east of it. The sea-gate is near the south-east angle of the fort, from which the narrow channel of the creek (which skirts the east side of the town, affording a passage for small boats only at high water), is distant rather more than a cable's length.

Northward of the town the creek runs inland, but it is merely the bed of a water-course, with a standing pool here and there, except during the periodical rains and the night spring tides of the fine season. The creek's mouth is obstructed by sand-banks, which change with the least change

* *See* Chart :—Gulf of Kutch, by Taylor, No. 43 ; scale, $m = 0{\cdot}4$ of an inch.

of wind and consequent swell; although nearly dry at low water, small boats can enter soon after the flood has made, and coasting craft of moderate burthen soon after half-flood. Freshets from the interior during the rainy season have an excellent scouring effect upon the fair channel of Mandavee creek, but the first subsequent sea-breeze spreads the choking sand-banks again.

Trade.—Mandavee is a very opulent and busy port; its merchants trade by land and river with Marwar, Sindh, Katiawár, &c.; and by sea with Bombay and nearly all ports of western Hindostan, the Persian gulf, Maskat, the Red Sea, Gulf of Aden and East coast of Africa (principally Bérbereh and Zanzibár), and sometimes, but rarely, the Mozambique channel. From Bombay are imported the usual European goods and refreshments consumed by the British troops in Kutch, and a large quantity of English thread, with which the Mandavee cloth (rather famed for its quality), is woven. The imports from Africa are ivory, rhinoceros hides and horns, cocoa-nuts and betel-nuts; a gum called *chund-roz* used in dyeing and varnishing; at times, seeds, as joári, mung, and til; gold in dust and ingots, dollars and venetians. Of late years also a cheap coarse and strong *American* cotton cloth (hence called *mirikáni* by the Kutchees), has been much imported, obtained from American vessels at Zanzibar, and highly prized for its durability as wearing apparel by the natives of Kutch. The exports from Mandavee consist of cotton, cotton-cloths (all woven as above with English thread), and brass in wire and rods.

The cloth yard-measure used is the *guz*, of a trifle over 33½ English inches, and there are 24 *tasu* to one guz. The current coin of Kutch is the *kúri* or coori, 404 of which (as established by the British Government), go to 100 Bombay rupees; this exchange, however, is not recognized by the native merchants, by whom the trade is calculated in dollars (reals), and venetians (either múgrabi or sitráni). British authority in Kutch is represented by the Political Agent or Resident at Bhooj, who has also a marine residence by Siráia village on the east of Mandavee creek, where a flagstaff will be seen.

People.—The population of Mandavee comprises Banians and Bhatias; Rajputs with other Hindus of various castes, and Muselmín. The two first-named tribes are the wealthy ones, they eat no animal food, and are bound by their religion not to take the life of the smallest creature; they pay a tax to the Ráo, in consideration of which their feelings are respected, and peacocks and pigeons (so numerous in and around the towns), are forbidden to be killed. Strangers should be warned of this, as the surveying officers gave great offence by their slaughter of those birds, through ignorance of native prejudices, on their first landing in Kutch.

The crews of the fleet of boats which trade with Africa and Arabia are sometimes Muselmín, but principally Hindoos. As sailors they are bold and skilful, the Rájputs notedly so; their *muálims* (the pilots of Kutch) are a caste deservedly famous for skill and daring; many of them have quadrants and nautical tables, and can determine the latitude by sun and pole-star, and their longitude by dead reckoning. Some of the boats are large, well built and decked, and carry a pair or two of carronades. They sail for Africa about the beginning of October, and return just before or with the S.W. monsoon. The late arrivals, finding generally too much swell in Mandavee roads, and surf on the bar, have to run over to the sheltered anchorage at Chánka (see page 217), and, despatching much of their cargoes by small boats to Mandavee, when lightened, take advantage of the first lull of the monsoon (for which they have to wait only a few days), and come bumping over the bar into Mandavee creek at high water.

Mandavee Creek.—Boats drawing more than 9 feet water can seldom enter Mandavee creek at the most favourable season (October to February), when the rains from the hilly country have scoured out a deep channel. In some years, the freshets do not successfully deepen the channel, but, carrying out great quantities of sand, deposit it outside the entrance; and this, being levelled by the westerly winds, so chokes the creek entrance, that, at high water of neap tides, boats only drawing 5 or 6 feet cannot get out. With the westerly winds, after February, the entrance begins to get choked up with sand; until, in May, a boat drawing 7 or 8 feet has to bump over the bar to get into the creek; and, in the latter part of May and beginning of June, frequently a dozen vessels are rendered useless by this operation, and as many more have to undergo a thorough repair.

These boats, coming from Bombay and distant parts, knowing that it is about high water, never give a thought as to the depth of water; but, running in carelessly, take the ground, and bump till the receding tide leaves them high and dry, when their goods are landed in carts; and the vessel, being lightened, floats in at next high tide.

Nanáo hill, 22 miles north of Mandavee, is of a round form, 1,280 feet above the sea, and is seen in clear weather 40, sometimes 50 miles off, and even, occasionally, when Dwarka temple is also in sight. There is a range of hills to the west of Nanáo, the highest part of which is a sharp peak, 830 feet high, 6 miles south-west of the latter; but the greater elevation of Nanáo renders it visible first in clear weather, though in hazy weather, the sharp peak, which is called Kéri Kubba, is first visible from the westward.

LIGHT.—Mandavee lighthouse shows a *fixed* light on the south-west bastion of the fort, and 90 feet above the mean sea level, but its

light cannot be seen at a greater distance than 9 or 10 miles, except in very clear weather.

TIDES.—It is high water, at full and change of moon, at Mandavee at 0 h. 15 m. This time is sometimes retarded by several minutes during westerly, and accelerated during easterly winds. The rise and fall is, at ordinary springs, 15 feet, and sometimes at high springs 17 feet. At neaps it is 9 or 10 feet.

In navigating the Gulf of Kutch, vessels should always make allowance for the tides, which run 4 or 5 miles an hour at springs, and 3 at neaps, east and west, between Chinri reef to the southward, and Ranwára to the northward. All across the mouth of the gulf the bottom is very uneven, and the rapid tides cause a very confused breaking sea, even in a depth of 30 fathoms.

The tides at the anchorage off Mandavee, in 3 to 5 fathoms water, run at the rate of 3 knots an hour on the springs, and at neaps less than 2 knots; further out from the shore they increase in strength, and, on the Ranwára, attain a velocity of 5 knots on the springs, and 3 at neaps. This strength of tide is maintained between that shoal and the reefs of Chánka, Noru, and Bida, to the southward, and cause a heavy deceiving break, in many places, where deep and shallow water are contiguous.

Between Mandavee and Tamásha the soundings gradually increase off shore to about 10 fathoms at 4 miles distance; outside of that, and to the westward towards Assar, and a little beyond it, there are overfalls from 5 to 10, and in some places to 20 fathoms. The tides, running with great velocity over these rocky patches, cause a heavy rippling and break, which is very deceiving to a stranger.

ANCHORAGE.—There is good anchorage for ships, in 3 to 5 fathoms at low water, clay bottom, from $1\frac{1}{2}$ to $2\frac{1}{2}$ miles due South of the fort; and nearer the shore for small steamers, in 2 fathoms, sand and mud, with the lighthouse N. by W., and the Political Agent's flagstaff (on the east side of the creek to the right of the large banyan tree) bearing N.E. by N. There is a shoal rocky patch bearing S.W. $\frac{1}{2}$ S. rather more than 2 miles from the lighthouse, having 11 feet only at low springs.

RAWUL PIR is a white tomb, 70 feet above the sea, in a clump of trees on sand-hills, $2\frac{1}{2}$ miles E.S.E. from Mandavee fort. This tomb *on with* Nanáo hill clears the east end of the Ranwára. Between Rawul Pir and Mandavee fort, by the village of Seraia, stands the marine residence of the Political Agent in Kutch, with a flagstaff in front.

MODWA POINT is 8 miles eastward of Mandavee; the intermediate shore is fronted with sand-hills, 30 and 40 feet high. The point itself is a [illegible]h sand bluff, and off it there is a ledge of rocks dry at low water which, [illegible]leep-to, having 3 and 4 fathoms close to them. Inside the point

is an extensive backwater, which runs back to within 2 miles of Rawul Pir, but is only entirely flooded at very high spring tides, and at high water in the S.W. monsoon.

Behind Modwa point there is excellent shelter for small vessels hauled up in the S.W. monsoon, and it is preferable to Mandavee creek, as there is a depth of more than 2 fathoms on the bar at high water springs, and it is protected from westerly winds. The ledge of rocks before mentioned extends nearly a mile to the eastward of these. To the south-west of the bluff, the sand dries out for nearly a mile from the shore.

The coast line, east of Modwa, recedes from the low water line from 2 to 3 miles, but there are long thin strips of sand, from 5 to 10 feet above high water mark, fronting the sea, which are from half a mile to one mile distant from the sea at low water; between these and the mainland is an extensive swamp, which is covered with mangroves, and intersected with numerous small creeks, where boats go to cut firewood.

NAVINÁR, or NAWINÁR POINT, 20 miles eastward of Mandavee, consists of two or three thin strips of sand, the highest part of which is not 10 feet above high water mark. The main land here recedes 4 miles from the point, and the intermediate space is a vast swamp, covered in places with mangrove bushes, through which runs up the Nawinár creek, and many other small ones. Nawinár point is deep-to, having 11 and 12 fathoms south of it, less than three-quarters of a mile off. To the eastward of Nawinár point there is shelter for a few small vessels, during westerly winds, in 2 to 3 fathoms, with the point W.S.W., out of the strength of the tide.

TIDES.—High water at Nawinár point, on full and change of moon, at 0 h. 50 m.: rise and fall at springs, 16 feet; neaps, 9 or 10 feet.

SONÁR DURRI, a sand-bank between Modwa and Nawinár, consists of detached sands, which are dry at low water, with deep water between them. The western ones are $4\frac{1}{2}$ miles E.S.E. of Modwa point, and the eastern ones $6\frac{1}{2}$ miles W. by S. of Nawinár point. The southern sides of these banks are deep-to, having 12 fathoms 2 or 3 cables' lengths off. A vessel ought not to shoal under 15 fathoms here. During the first half flood, and after half ebb, the shoals may be distinguished by the rippling of the water. And indeed they may always be distinguished from the mast-head by the discoloured water on them.

The only near landmark that could be distinguished by a stranger is a sand-hill (marked as such on the chart) about 60 feet high, north-west of the Kootree creek. This is called by the natives Nawinár-ka-Diva, and also Modwa, which simply means a sand-hill; but, to prevent its being mistaken for Modwa point, this name is not given on the chart. Jeerpra

large tree (4 miles inland of the sand-hill) is about one point open to eastward of the sand-hill; or the hill is bearing North, when a vessel is to the eastward of the Sonár Durri sands. While the sand-hill bears to the eastward of North, Rawul Pir (seen from aloft) must be kept open to the left, or to seaward, of the projecting coast of Modwa point.

Gundiári tree, a large banyan tree, 5 miles north-west of Modwa point, seen just open to right, or eastward of the high part of that point, will lead a ship clear to the south-westward of Sonár Durri. When to the eastward of this transit, do not come under 15 fathoms till the sand-hill bears North, as above mentioned. But, when to the westward, the shore may be approached into 7 fathoms water, and, towards Rawul Pir and Mandavee, to within 5 fathoms.

MOONDRA CREEK mouth (between mangrove bushes) bears N.N.E. 3 miles from Nawinár point, and it runs up to a bunder-house N.N.W. for little more than one mile. The house is perfectly isolated at high water springs, the tide flowing a mile to the northward of it. There is no constructed road from the bunder to the town, and the mud left by the receding tide renders it a matter of great difficulty for carts to carry goods to and from Moondra. The Bunder house is $3\frac{1}{2}$ miles N. by E. of Nawinár point.

Three miles eastward of Nawinár point there is the south end of a two-and-three-fathom bank, lying N.E. and S.W., $2\frac{1}{2}$ miles long and 3 or 4 cables broad; and north-east of this again there is a three-fathom bank, 2 miles long, lying N.N.E. Between the south end of the former shoal and the shore low water mark (which is here 4 miles from the main land) there is a small patch having only 7 feet on it. On account of these banks off Moondra a vessel should not shoal under 10 fathoms, in going to the eastward, till Búdresir temple bears N.N.E., when she may stand in to 5 fathoms, bottom all mud.

Moondra Fort, situated north of the Bunder house $2\frac{1}{4}$ miles, has a white mosque, distinguishable a good way off, and a grove of high cocoa-nut trees half a mile to the westward of it.

The coast from Moondra to the Nukti or Toona creek entrance, is nearly straight, about E. by N. $\frac{1}{2}$ N., and the mud dries to nearly four miles off the shore by Moondra, and two miles off towards Toona.

The soundings are very regular, and bottom mud. All along the Kutch coast, water-courses empty themselves into the sea during the rains, and the whole coast from Modwa to Toona is very low, with cocoa-nut trees by all the towns west of Búdresir.

BÚDRESIR TEMPLE, 11 miles E.N.E. of Moondra, has a small white dome which points it out very well, and may be seen 9 or 10 miles from a

vessel's deck. There is a grove of trees 1¼ miles south of the temple, and Búdresir fort is a little west of it.

Toona fort stands some distance inland, about a dozen miles E.N.E. from Búdresir fort; the intermediate shore is quite low and sandy, with 2 or 3 little villages.

NUKTI CREEK, called also Toona creek, as one branch of it leads up to Toona bunder, is 13 miles east of Búdresir; its west point is very low, covered with mangrove bushes, and nearly overflowed at high water.

Tekra.—The only object that marks the entrance of Nukti creek is a mud island, covered with trees, 15 and 20 feet high, called Tekra by the natives; it is about three-quarters of a mile long, N.W. and S.E., and about a mile to the northward of the point above mentioned. Boats bound from Mandavee to Júria on the opposite side of the gulf, in the N.E. monsoon, run along shore and sight the Tekra before they branch off to the southward. Júria bunder bears about S.S.E. ½ E. distant 15½ miles from Tekra.

There is a passage into Toona creek on either side of the Tekra, for boats after half-flood, but both channels are closed at low water by a bank of sand, extending south of the island. A vessel drawing 9 feet water may at high water haul in round the point, making plenty of allowance for the flood tide, which sets across N.N.E., about 4 knots at the springs. The eastern channel is the best defined, as it is nearly straight, along a steep mud bank, and trending about W.N.W., after the vessel has passed round to the eastward of the Tekra.

Toona Bunder lies 4 miles north-west from Tekra; and, though it is the seaport of the large town of Anjar, is an insignificant place: with difficulty can boats of 50 tons burden get there at high spring tides, as it is up a small creek, not 30 yards wide, branching away from the Nukti, which creek, but for posts that are erected on each side of its entrance, would not be discernible. The flood tide rushes by the small mouth of this creek to the northward, with a velocity of 4 miles an hour. A pilot of the place would be required to take the vessel in.

Rohar, 7½ miles to the north-east of Toona fort, is now a very small village, inhabited by a few fishermen and wood-cutters. Its former inhabitants left it many years ago, as the shallowness of the creek rendered it unfit for trade, and they then settled on the Halár side of the gulf by the fort of Júria.

The Kundlo creek joins the Nukti 3 miles above Rohar, and above this the latter creek runs in a north-easterly direction, navigable for about 10 miles, by wood-boats of 15 to 20 tons; further northward it is divided into small streams, which help to drain the Runn.

Above Rohar the villages are, Meeta or *sweet* Rohar, (in contradistinction to the other, which is Kára or *salt* Rohar) then Padána, Wursána, Chota Chiri, and Bára Chiri. These villages all lie about 3 miles from the channel of the Nukti and 1 to 2 miles from high water mark. Along this coast many fresh-water streams empty themselves during the rains.

TIDES.—High water at Toona bunder, on full and change of moon, at 1 h. 50 m. Rise and fall of tide outside the entrance is, at high springs, 18 feet; at ordinary springs, 16 feet; and at neaps, 10 feet.

From near Toona the Nukti branches away to the northward and eastward about 8 miles to Rohar, but is very shallow in some parts, especially one mile south of the latter place, where in January 1852 there was not so much as 4 feet within a quarter of a mile of the surveyor's boat at high water in the daytime, two days before full moon; at night there were 2 to 3 feet more, for the same difference occurs here between night and day tides as at Bombay.

KUNDLO CREEK mouth, amongst mangrove bushes on either bank, bears from the Toona Tekra E. by N. 5 miles. It runs up nearly north for 8 miles, when it joins the Nukti as already mentioned.

The intermediate space between these two creeks forms a large triangle, the base of which is southward. The ground is what the natives call Runn—apparently sandy when dry, but slippery and perfect mud when wet. It is intersected by numerous small creeks, along the banks of which grow mangrove bushes, which are cut for firewood. The south side, or sea face, of the island has thin strips of sand along it, and inside there are two or three small detached mangrove trees which may be seen at a distance of 5 miles. During the S.W. monsoon and at spring tides it is overflowed at high water, but at neaps in the N.E. monsoon it has time to dry; then it is excellent ground for walking.

HANSTUL, or **HAINTUL CREEK** mouth, 7 miles south-east of the Kundlo, is the broadest and the deepest of the three creeks that carry the sea water into the Runn of Kutch. The space between these two creeks is of the same description as that between Kundlo and Nukti, but being higher, is in many parts only flooded at high water in the S.W. monsoon. Off the south-west extreme of this island, between Kundlo and Hanstul, the sand and mud are uncovered at low water 5 miles out to sea; this, and the mud bank on the south—which takes a south-south-west direction—form a perfect funnel for the sea waters to pour into the Hanstul, and 8 miles inside its entrance there is a vast expanse of level ground, flooded at high water; consequently, the ebb tide in draining that space, and the flood in covering it, attain a velocity of 6 and 7 miles an

hour in the channel between the mangrove bushes, where it is only 4 to 5 cables broad.

The sea between the Kundlo creek and Júria is in many places very shoal, and unfit for navigation. No vessel should go eastward of a line drawn from Toona to Júria, beyond which there is nowhere so much as 4 fathoms, at low water, except in the narrow mouth of the Hanstul itself, which is 9 and 10 fathoms deep in a length of 3 or 4 miles.

The trend of the Hanstul is a little to the southward of east for about 2 miles, then gradually bending to the north-eastward; at 5 miles from its entrance it sends off two branches, one to the eastward, the Jinjúra, or Halái kári (meaning, the creek which leads to the Halár shore); the other to north-west, called the Kutchi kári (or the creek leading to the Kutch shore); this latter turns to the northward along the east face of the extensive Runn island between the Kundlo and Hanstul. The whole north side of the central island is intersected by numerous small creeks, where boats go to cut firewood, the supply of which is almost inexhaustible, as the mangroves grow so fast.

The Halái is navigable by vessels drawing 9 feet water for a distance of 4 miles from its leaving the Hanstul; to the eastward it becomes a mere ditch, which, however, enables canoes or small boats to get within a mile of the mainland sand-hills at high water. Jinjúra village, on the Halár coast, is 1½ miles east of these sand-hills.

The Hanstul, from the point where it is joined by the two aforesaid creeks, trends to north-east, and is navigable by good-sized boats for 6 or 7 miles; but, as the mangroves cease after 2 or 3 miles, there is but the ripple of the water in the deeper channel to point it out.

The whole space to the eastward of the mangrove bushes, from the Halár coast on the East, the centre Runn island on the West, and the Wágur coast on the North, is, at high water, like a vast inland sea of only a few feet depth, and in the westerly monsoon is navigated by boats of 3 or 4 feet draught, which have to glide through the mud as they approach either shore.

TIDES.—It is high water, at full and change of moon, at the Hanstul mouth at 2h., and about 2 hours later up the creeks, at the eastern limit which the sea-water reaches.

The RUNN.—In the N.E. monsoon, from November to February, the Runn eastward of Jinghi in Wágur, to Wuwánia on the south, is dry, and traversable by men and camels, but the fine sand of the surface, agitated by the north-east winds, blinds the traveller. In the westerly monsoon the sea water is propelled by the wind many miles to the eastward, and the Runn is then a great inland sea and quite impassable for travellers.

This vast sheet of water is subject to the regular tides, but the rise and

fall is not of any extent, though the Hanstul, from the great height of the internal waters, attains a velocity of 6 to 7 miles an hour at its mouth in ebbing. When, in January 1852, the rise and fall of the gulf water off the mouth of the creeks was 15 feet, it was only 5 or 6 feet to the southward of Jinghi, some 15 miles from Hanstul mouth: this difference of level of course renders the ebb tide, in the Hanstul deep channel, to be of longer duration, and the flood shorter, or respectively about 8 and 4 hours.

Between the Hanstul creek and the Halár coast there is a Runn resembling those already mentioned. Its western edge is fringed with mangroves, and the ordinary high-water mark (for in the westerly monsoon it is *all* flooded at high water) runs down from the Hanstul towards Júria fort, which is 13½ miles S. by W. from the mouth of Hanstul creek.

Between the Hanstul and Júria there is a little rocky island on the Runn, called Bora-ka-thul, about a mile from the ordinary high-water mark. It is covered with the cactus and other bushes, and fresh water may be obtained on it by digging.

The HALAR COAST.—The entire south side of the Gulf of Kutch is under a different sovereign, the Jam of Nowa-Nugga, whose territory commences with all the banks and creeks which lie southward and eastward of the Hanstul. The Halár coast has no high land; but the Birda hills, in the interior of Katiawár, are sometimes visible from this south side of the gulf in clear weather.

MUNGRA REEF, to the north-west of Júria, has its west end at the distance of 8 miles from the fort, and its east end 6½ miles. From it the mouth of the Hanstul bears N.E. by N. nearly 10 miles, and the mud uncovers, at low water, out to a line between them. The east end of Mungra reef bears S.E. ¾ S. about 12 miles from Toona Tekra.

The west end of the reef is deep-to, having 5 and 6 fathoms close to it. And three-quarters of a mile from this west extreme there is a heap of sand and shells, which is the first part that dries, then showing distinctly the position of the reef, and it lies with the North-west bastion and Durbár house in a line nearly. The breadth of the Mungra reef is one mile at the western end, and 1½ miles at the eastern; there is a deep channel along the south side of it, and a vessel may anchor, and be sheltered from strong north-east winds, with the sand-heap bearing from North to N.N.E. 2 miles off, in 3 fathoms, at low water, muddy bottom, with Júria fort E.S.E.

JÚRIA FORT bears S.E. by S. 21 miles from Toona fort. The North-west bastion, which is about 80 feet above the sea, and the Durbár house (300 yards south-east of the former) are high and conspicuous. And outside the fort, nearly a mile to the southward, there is a grove of high

trees. These three marks point out the place unmistakeably, and may be seen, in clear weather, 10 to 12 miles off from a vessel's deck. Júria north-west point is of low sand, and bears W.N.W. 3½ miles from the fort; the bunder is more than 2 miles to the north-west of the fort, and 1½ miles to eastward of the north-west sandy point.

Júria Bunder house is N.W. ½ N. 2¼ miles from the fort, and the entrance of the creek (amongst mangroves) is with this house one mile distant on with Júria trees. Boats, coming from Mandavee to Júria, keep along the Kutch coast, and sight the Toona Tekra before they slant off to Júria, and run round the east end of Mungra reef, with the bunder house bearing South, into Júria creek, but this cannot be done till after half-flood by boats drawing upwards of 7 feet water.

TIDES.—It is high water, on full and change of moon, at Júria bunder at 2 h.; rise and fall of tide is 16 feet at ordinary springs, and 9 or 10 at neaps.

BÁLACHÉRI is a small village bearing South-west from Júria fort 7½ miles; there is, at the distance of three-quarters of a mile to the north-west of the village, a small round conical hill, detached from the main, and insulated at high water; on the top of which is a Mahomedan Fakir's place, called Aku Pir, and half a mile south-west of this, on the west of the village, is a range of rocky mounds, 60 to 80 feet high, fronting the sea; they extend over half a mile of ground, north and south, and constitute the sanatorium of the English residents from Rajkote; when tents are pitched there, they make an excellent landmark. These tent hills are insulated at high water springs.

Between these hillocks and Aku Pir there is a small creek, off the mouth of which is a large rock, dry at half tide, and the mud and rocks dry at low water 1½ miles to the westward.

At the back of Bálachéri there is a range of hills, about 100 feet high, which terminate rather abruptly to the southward, at 1½ miles to the south-east of the village.

Nearly 3 miles to the south-west of Bálachéri there is a grove of trees, which may be seen 10 miles off bearing South when at anchor south of the Mungra sands. They are only a quarter of a mile from the high-water mark, which takes hence a direction of S.S.W. to D'huwáo creek, and thence trends west to Bayday, the bunder or sea-port of Nowa-Nugga.

Balachéri Reefs.—The Mungra reef has been already pointed out, and the deep water south of it; from its east end (which is connected to the main at low water springs by a dry flat of mud and sand) a low line of coral rocks dries in a south-west direction for 8 miles. At this point the Balachéri reefs commence, and extend 1½ miles to the southward. Along

their sea-face, where they are directly opposed to westerly gales, the rocks are more heaped up, and are dry sooner, being uncovered soon after half-ebb.

The south-west extreme of these northern Balachéri rocks, which form a very projecting reef, bears from the Bálachéri tent hills N.W. by N. 4 miles. At the same distance W.N.W. of the tent hills, there is a separate coral reef, nearly one mile long east and west: its west side is deep-to, and there is a depth of 3 fathoms between it and the main, and 4 or 5 fathoms on its north-east side, between it and the south-west projecting point of the reef mentioned before; but any vessels, when navigating this part of the gulf, must take a native pilot.

Anchorage.—The fair channel into Balachéri roads is with Aku Pir bearing between S.E. ½ E. and S.E. by E. ½ E. Between these bearings a vessel may anchor, during the N.E. monsoon, in any depth from 5 to 3 fathoms (according to her draught). The bottom is soft mud, and this position is protected from N.E. gales by the reefs to the northward.

D'huwáo town lies about S.W. by S. 8 miles from Bálachéri; the entrance of its creek, amongst mangrove bushes, lies 4 miles north from the town, and the mud dries for upwards of a mile beyond this. The line of coast is 1¼ miles from the town. E.S.E. of D'huwáo, and about 3 miles off, there is a low table-hill, about half a mile long; and 1½ miles eastward of that are two mounds resembling paps.

NOWA-NUGGA, the largest and best fort in the gulf, 4 miles W.S.W. of D'huwáo, and 18 miles to the south-west of Júria fort, is the capital of the independent state of Halár, which is ruled by the Jam of Nowa-Nugga. British authority is represented along the south side of the Gulf of Kutch by the Political Agent in Katiawár, whose head quarters are at Rajkote, 50 miles to the south-east of Nowa-Nugga.

The Kota is a high circular turreted building on the west side of the fort, 182 feet above the mean sea level, and, from its whiteness, may be seen in clear days, when the refraction is great, at 20 miles distance, and commonly at 15 miles. Rather more than half a mile to the east of it, stands the Durbar house, a large building with a gable roof at either end, and half a mile to the north-west, outside the fort, is a look-out tower; all three are conspicuous objects.

Bayday, a little village and fort, where stands the bunder or sea-port of Nowa-Nugga, is 2½ miles north-west of the great fort. Boats can come up the creek to within three-quarters of a mile of this little fort.

The mouth of Bayday creek is about 2 miles from the anchorage off Nowa-Nugga, and nearly 1 mile to the north-west of Roji temple; its west side is rocky, and the east side soft mud.

Roji.—Directly north of Bayday, there is a piece of rocky land, more than 2 miles in length, north and south, and $1\frac{1}{4}$ in breadth, insulated at high spring tides, on the north end of which is a Hindoo temple, called Roji, having a staff and a small flag on it.

Water.—Close to the westward of Roji, there are trees on the edge of a taláo, or tank of fresh water; these trees are about 50 feet above the sea: watering by a ship's boats is here easy, and supplies for a Lascar crew are obtainable from Nowa-Nugga.

TIDES.—High water at Roji, at full and change of moon, at 1 h. 40 m.; rise and fall at high springs 18 feet, at ordinary springs 16, and at neaps 10 feet.

ANCHORAGE.—The anchorage off Nowa-Nugga is with Péritan island just seen outside of the large mangrove island between it and Roji, and with Roji temple bearing S. by W., or both the towers of Nowa-Nugga open to the left, or eastward, of all Roji land, in 2 or 3 fathoms at low water, well sheltered from the westerly winds which prevail from February to October inclusive. The bottom is such very soft mud, that a vessel can safely anchor in her own draught of water; the entrance of the creek will bear from this anchorage S.W. by S.

West of this anchorage, half a mile, there is a small detached reef, dry at low water, having a passage between it and the main reef. And $1\frac{1}{2}$ miles N. by W. of the anchorage, there lies a 2 fathoms rocky patch. The Durbar house, touching the eastern extreme of all Roji land, is on the line of both these shoals.

DIRECTIONS.—In coming from the westward, a vessel, passing one mile to northward of the Péritan reef, must stand on East, till all the high towers of Nowa-Nugga are seen (from aloft) to the left, or eastward, of all Roji rocky land; this is to avoid a $2\frac{1}{2}$-fathom patch lying 5 miles east of Péritan.

In coming from the north-east, Bayday fort should not be opened to the left of, or eastward of all Roji land; for, on this bearing and all eastward of it, the ground is rocky at the distance of $1\frac{1}{2}$ miles east of the above-mentioned anchorage; so that, Roji temple bearing from S. $\frac{1}{2}$ W. to S.S.W. $\frac{1}{2}$ W., are the limits between which to anchor.

PÉRITAN.—Extending a long way to the north and west of the entrance of Bayday creek, there is a mangrove swamp, with a sand-bank on its north-east face, the north extreme of which will bear between W. $\frac{1}{2}$ S. and W. $\frac{1}{2}$ N. from the anchorage above described; and, separate from and westward of this sand again, at the distance of 6 miles N.W. by W. of Roji, there is a detached mangrove island, whose trees are 20 to 30 feet above high water, the highest being at the north-east end. This is called Péritan, and is an excellent land-mark in making

this coast, as the trees, like those of the Tekra on the Kutch coast, are not allowed to be cut down.

Off the Péritan, a vessel ought not to shoal under 20 fathoms, till its high trees bear to the westward of South. Here it may be useful to the navigator (when going direct from Mandavee to Nowa-Nugga), to know that Péritan bears S.E. by E. about 15 miles from Nowanár point on the Kutch coast.

A coral reef, steep-to, and dry at low water, extends off this island, one mile to north-east, and three-quarters of a mile to south-west: the west side of Péritan forms the east side of the Surmut Kári entrance; and, when the reefs are dry, a vessel may conveniently anchor, to get shelter from north-east winds, in the mouth of the Surmut, with the Péritan trees bearing N.E. by E., in 5 or 6 fathoms, muddy bottom.

Soundings.—Eastward of a line from Nowa-Nugga on the south, to the Toona Tekra on the Kutch coast, there was in 1852, at low water, nowhere more than 10 fathoms water across the gulf, whereas the charts of 1821 represent the head of the gulf as much deeper, and there can be no doubt it is gradually filling up. Eastward of a line from Péritan to Búdresir there is nowhere more than 20 fathoms.

The COAST.—From Nowa-Nugga to the westward for more than 30 miles, the mainland of Halár recedes 4 to 6 miles from the sea face of the reefs which bound this coast, and it has no distinguishable objects, with the exception of two or three hills, which are too far off to set as landmarks: but clumps of mangrove trees, on the reefs, form excellent guides; they are not allowed to be cut down, and are named by the boatmen Péritan, Déra, Núrira, Karúmba, and D'húni.

The Birda hills are frequently visible from this side of the gulf; and, off Roji, they may be seen on a clear day (a distance of 46 miles).

Surmut.—South-west of the Péritan there is the entrance to the Surmut-kári, between reefs, a little more than three-quarters of a mile wide; and at the same distance within the entrance there are some rocky patches, which render it unsafe to run far in without a pilot, but a vessel may anchor from a quarter to half a mile to the south-west of the Péritan reef, in 5 fathoms, mud, with the high trees bearing N.E. ½ N. to E.N.E., and be well sheltered against strong north-easters. But it will not be prudent to run in there till a couple of hours after high water, when the edge of the reef will be quite dry.

DÉRA is a range of low sand-hills, 6 miles south-west of the Péritan. (The name is applied to the coral reef surrounding it, or the whole space included between the Surmut and Seeka inlets.) The north-west end of Déra is bluff, about 15 feet high, and off it are a few scattered stunted mangroves. To the eastward these trees are thicker,

and there are two or three single conspicuous trees at the distance of from 1 to 1½ miles east of the bluff. The reef extends off Déra sand-hill nearly 1½ miles to north-west.

The Seeka inlet is 2 miles W.S.W. of Déra, and is navigable for only 4 or 5 miles at low water; but, at high water, large boats can pass through channels amongst the mangrove bushes, almost in a direct line to Roji.

NÚRIRA is a clump of trees with a sand before it, distant 8 miles about W.S.W. from Déra sand bluff. The reef extends off it 1½ miles to northward, where the rocks are highest, and 2 miles to north-eastward. A mangrove swamp joins Núrira clump with the main land.

In the centre of the bay, between it and the Déra, lies the Goos reef, more than 3 miles long, east and west, and 2 miles broad. Half a mile from its northern side there is a long sand that dries before the reef itself, and shows well.

On its southern and western sides are deep-water channels, which, as well as that on its eastern side, bear the name of Seeka-kári. These channels are used by the native vessels when it is blowing very fresh, as they thus avoid the heavy sea outside. The northern edge of the Goos reef is on the line from Déra bluff to Núrira.

Soundings.—A vessel should not, in working, come under 12 fathoms between Núrira and Péritan, and not under 15 fathoms when north of the former and between it and Karúmba. There is nowhere so much as 25 fathoms at low water, eastward of a line from Déra to Moondra in Kutch.

KARÚMBA is a mangrove island, 4 miles long, east and west, and of little less length north and south, with a clump of high trees on its northern edge, which bears from Núrira W. ¾ S. 6 miles. North of these trees the reef dries 1½ miles off, forming a projecting point, from which the line of reef on the one side trends to south-west for 4 miles to the entrance of Seraia-kári, and on the other takes a south-east direction for 2½ miles to another channel that leads round Karúmba island up to Seraia: the mouth of this is nearly midway on the line from Núrira to Karúmba, and its channel is very deep, but narrow, and 3 miles up is only navigable at high water by standing over the reefs. A vessel may run in for half a mile at low water, when the reefs are visible, and be well sheltered from westerly winds.

The point of rocks north of Karúmba is deep-to, and a vessel should not come under 20 fathoms; but, with the trees bearing S.E., you can come into 15 fathoms, mud; and with them E.S.E. into 7 fathoms. Between the trees of Karúmba and those of Chánka island, there is nowhere to the southward more than 10 fathoms at low water, except in the mouth of Seraia creek.

From Karúmba trees a thin low strip of sand, with mangroves on the sea side, runs to W.S.W. 2½ miles; its west end is higher, and has bushes on it, the tops of which are 10 feet above high water mark. The rocks dry a little more than a mile west of this sand, and a vessel will find excellent shelter from North-easters by anchoring 2 or 3 cables' lengths from the reef, in 6 to 10 fathoms, mud, with this nearest point of the sand E. by N., after Karúmba trees have just passed behind the north point of high sand; and with a large banyan tree on with a little conical hill 11½ miles off, bearing S.S.E. ½ E. These last are the leading marks into Seraia creek. Towards low water the reefs are well defined, and at any time the mast-head look-out man will discern them, when within 2 or 3 cables' lengths.

D'HÚNI is a tuft of trees on sand, 6 miles W.S.W. of Karúmba, forming the west point of Seraia-kári, which runs up 9 miles to Seraia bunder, a very small place. The principal town, to which goods are carried by land, is Kambália, which is 6 miles south-east of Seraia: the creek is known by both names, Seraia and Kambália.

CHÁNKA is a little island covered with trees, 9 miles north-west of D'húni trees: and from hence to Vománi, the north point of Okha-mundel, this end of the gulf has nothing but reefs and islands, with good channels amongst them, which are most useful to coasting craft during strong breezes, when there is a heavy swell outside.

Chánka is the north-eastern of 4 islands on the great Burál, or Chánka reef, the north face of which is 10 miles in length. The north-east end of the reef forms in a full semi-circle, with a radius of 1½ miles round Chanka island; after the first-quarter-ebb the rocks at its margin begin to show themselves.

Búbasir Rock, on which a small post is erected, lying rather less than a mile from the eastern edge of the above reef, bears S.E. by E. 2¼ miles from Chánka trees.

ANCHORAGE.—To the east and south-east of Chánka trees, there is good shelter for ships of any size against westerly winds, the beacon on Búbasir rock making navigation easy.

A good anchorage is in 5 fathoms, mud, at low water, about half a mile south-west of the rock; but a vessel, only taking shelter for a single tide, may anchor to the north of it in 8 or 9 fathoms, mud, just on the edge of the shoal soundings, with Búbasir beacon S. by W. and Chánka trees West.

This anchorage on the east of Chánka in the S.W. monsoon is worth knowing. A vessel disabled between Dwarka and Karáchi, and unable to claw off the coast, need not now, with the latest charts on board, have any fear to seek shelter in the gulf of Kutch. Rain seldom falls hereabouts, so the shore is not completely hidden, as off Bombay; in the daytime the

towns and trees between Dwarka and Bate island will be discerned from aloft, and a vessel can run in to northward or southward of Béka shoal. But as, after passing Chinri reef, she would be unable, with a *south-west* wind, to haul up to southward to clear Hun'man-dánda and fetch the anchorage on the east side of Bate island, she must stand to the eastward along the north face of Burál reef.

Care should be taken, in approaching this reef at high water, to keep a good look-out for the trees on Noru and Chánka, which should not be approached nearer than 3 miles till the vessel is off the latter, when she should haul up to the south-east when Chánka trees bear South, and then the water will soon become smooth, and she may anchor in 8 or 10 fathoms, mud, about one mile to the eastward of Búbasir rock, and 3 or 3½ miles from Chánka, with the trees bearing W.N.W., where the ebb sets to north-west and the flood to south-east.

Large native vessels, arriving from the Malabar and African coasts, after the commencement of the S.W. monsoon, seek shelter to leeward of Chánka, and there discharge the bulk of their cargo into smaller boats, which, watching their opportunity, bring the goods over to Mandavee; the larger vessels follow at spring tides, and boldly run into Mandavee creek at high water in the daytime when the tides are highest.

Soundings.—Between Búbasir and D'húni fringing reef (the latter is 5 miles south-east of the former) the bottom is generally mud, though a few casts of hard ground were found, but the water is not deep. In working to the westward, amongst the reefs and islands, the native boatmen usually wait till the falling tide makes the banks apparent. The most minute description of these channels amongst the islands would not be sufficient for the guidance of a large vessel, which should take a native pilot, as the tides are so strong in some places; and an intimate knowledge of their set is necessary, as the eddies make a vessel unmanageable in light winds. The set of the tide during the first hour of ebb, when it runs out over the reefs, is of course very different from the direction it takes after half-ebb, when it is confined within narrow deep channels.

But before describing the inner passages, the navigation along the sea face of the reefs, from Chánka to Bate island, must be noted.

BURÁL REEF, the vast coral reef surrounding the islands of Chánka, Noru, Bida, and Chúsra, is completely covered at high water of spring tides, the islands only being then visible. Its northern face is very deep-to, the soundings irregular, from 20 to 36 fathoms, and the tide rushes by with a velocity of 4 to 6 knots. Off its north-east end the water is shoaler, 15 to 19 fathoms, and beyond this there is a bank on which are found rocky

patches of 7 and 8 fathoms: there is no danger on this bank, which extends more than 10 miles to north-east of Chánka, although the shoal water and uneven bottom cause heavy ripplings and breaks, the rush of tide being so strong.

Noru is a large low mangrove island, on the great Burál reef, situated 2½ miles to westward of Chánka trees; it is nearly 3 miles in length, east and west; its north face is fronted with sand, at the east end of which are the highest trees, about 25 feet above high water.

On the north of Noru, the Burál reef is deeply indented, and the soundings are mostly mud near the reef in the two angles, where small coasters, when working tide-work, with westerly winds, can, at low water, find anchorage, where they wait for the next ebb.

Bida is a mangrove island nearly 2 miles across; its west face is fronted with sand, the north end of which is highest, being nearly 20 feet above high water, and it lies 3 miles south-west of Noru.

Chúsra, a small rocky islet, with a clump of trees on its northern end, stands 2½ miles south-west of Bida, and marks the southern extreme of the Burál reef, as it is only 3 cables' lengths within the south point of the rocks. Chúsra trees are a most excellent mark for navigating these inner channels.

The north-west extreme of Burál reef, which extends nearly 6 miles to the westward of Noru highest trees, and is 7½ miles to northward of Chúsra, has the rocks at its edge piled up in three places, which are dry in rather more than one hour after high water of spring tides, and at neaps are scarcely covered at all. The Ráo of Kutch (to whom the Burál reef with its islands are said to belong) promised to erect a beacon on that point, that vessels might avail themselves of the shelter against N.E. winds afforded in a snug anchorage with a depth of 4 or 5 fathoms, muddy bottom, 3 or 4 cables' lengths to the west of the fringing reef; the bearings for which are as follows:—

ANCHORAGE.—Chánka trees, (seen from aloft,) just touching the north sandy face of Noru island, bearing East; and Chúsra trees bearing S. by E. ¼ E. (on with Quoin hill (see page 222), which is 15 miles distant, and only seen above the deck, and in clear weather). This is a good anchorage, in 4 or 5 fathoms, mud, where no ebb tide is felt, and very little flood. To the southward of it there are patches of shoal water; and a bank of sand and rock, with overfalls from 5 to 7 fathoms, extends to the westward to Chinri reef, and southward to the Pága reef: over this bank the soundings are everywhere alike, ranging between 5 and 10 fathoms; but in the centre there is a deeper gut, having 12 to 15 fathoms; the bearings of the land must then be the sole guide, as the soundings, except

when in the centre, will not indicate a vessel's position; and, at spring tides, the ripplings and breaking water frequently alarm a stranger.

PÁGA, or TURTLE REEF, lies 3 miles to the north-west of Chúsra trees, and to the west of Bida, allowing a passage one mile broad between it and Burál reef. Its greatest length is nearly 4 miles, south-east and north-west; on its west side is a heap of sand, which is only completely covered at high water springs, and forms a good mark. Okha-mundel south-east bluff (which is 8 miles south of Poshétra), seen between the Brothers, or Sahn islands, is the mark which will keep a vessel clear of the south-east extreme of the Pága reef, and will lead in clear to those islands.

The highest peak of the Birda hills (seen only in clear weather, see page 191), on with, or one degree to the left of the highest part of Ajár island (seen from aloft), clears the north-east side of Pága reef.

CHINRI REEF, 2 miles north of Bate island, has also a sand-heap, only covered at high springs, on its south side, which bears N.W. by W. ½ W., 4½ miles from Pága sand; the reef that dries extends more than one mile, and shoal water nearly 2 miles, to the northward of the sand; the eastern extreme of this shoal water bears E.N.E. nearly 2 miles distant from the sand. To the south of Chinri sand the reef is deep-to, and there is a passage, one mile wide, between it and the reef off Bate island; but, between it and Sainia island, the water is shoal, with overfalls from 3 to 8 fathoms.

BATE ISLAND, a long narrow crooked strip of land, lies to the west of Pága reef, to the south of Chinri reef, and to the eastward of Okha point. From its north-east to the south-west end it measures 5 miles, but in its windings the island's real length is more than 8 miles. The east half is sand, the west half is rocky table-land; the division being well marked by some cocoa-nut trees, which serve most usefully as landmarks for entering the harbour. The whole island abounds with temples and shrines in honour of Crishna; the population, being principally Brahmins, is mainly supported by the pilgrims who resort here. The principal temples, being in the fort, on the west side of the island, formerly called Kalor-kota, were blown up with it in 1859; before that time the island had 500 houses and 3,000 inhabitants.

The eastern end of Bate, composed of sand-hills and bushes, lying 3 miles to the west of Pága sand, is called Hun'man point, after a temple of that name, situated about half a mile within the point. The reef to the northward of this point is called Hun'man-dánda, and extends 1½ miles to north-east of the sand-hills that border the island's north side.

A vessel, coming in along the south side of Chinri reef, must pass its sand-heap at one cable's distance, and stand to the East, not letting Arámra

tower disappear behind Bate island, till Chúsra trees just touch the right or south side of Pága sand, which bearings will lead her clear of Hun'man-dánda; then she may steer to the S.E. with the latter marks on, gradually opening them as she hauls to the southward and as the Kiu hills begin to appear to the left of the bushes on Hun'man point, when she may steer for those hills, about S.W. by S. (according to tide, remembering that the ebb will force her to westward against the Hun'man-dánda), and anchor off the east end of Bate island, as follows.

ANCHORAGE * off the east end of Bate island, well sheltered from westerly gales, and approached as above, may be had in 5 or 6 fathoms, mud, rather more than half a mile from the shore, with Hun'man temple N.W. by W., the sandy extremes of Bate island from S.W. by W. to N.N.W., (the Chinri sand being just shut out of sight by the latter bearing,) where the ebb sets to the northward, but the flood is scarcely perceptible. To the eastward of this anchorage the bottom is rocky, so it is well to anchor near the island, the water during westerly winds being perfectly smooth.

Bate Inner Harbour, on the west of the fort, is land-locked, but unfit for large ships, having so much rocky ground. If wanting to anchor off Bate fort; after the south end of Sainia is brought to bear W.N.W., (as at page 198,) stand to the south-east, over the flat, for the cocoa-nut trees, when they are on with a large round tree, until the south-west bluff of Bate island is just disappearing behind Háji Kurman's point, when the steamer must be hauled up to the south and west, and may round the latter point at less than 2 cables' lengths, and anchor to the south-west of it, with Bate fort E.S.E. to E. by S., in 4 or 5 fathoms, rocky bottom. Of course none but a steamer could enter as above.

OKHA-MUNDEL EAST BAYS.—Between the sandy south-east side of Bate island and the main land of Okha-mundel the passage is very shallow, having a bank in mid-channel which is nearly dry at low tide. The water deepens towards the south extremity of the island, but the many sunken rocks make it unsafe for navigation without a pilot.

Poshetra Point is nearly 4 miles to south-east of the east end of Bate, and the town of Poshetra is on high ground nearly 2 miles south-west of the point; there are two large banyan trees to the north-west of the town, which are conspicuous objects.

There is a sunken reef one mile northward of the point; and eastward of it, foul ground for nearly 2 miles. A sand-bank on this foul ground, called Bória, only covered towards high water, marks the east extreme; but a separate little reef lies to the north, between which and Pága reef

* *See* Chart of Bate Harbour, by Taylor, No. 47; scale, $m = 2$ inches.

there is a channel 1½ miles broad. Chúsra trees, touching the north end of Ajár island, are the leading marks through this passage.

When clear to the northward of these Bória reefs the Kiu hills are seen, open to the right of Poshetra point. When clear to the eastward the south-east bluff of Okha-mundel table-land is seen between the Brothers.

The BROTHERS, called by the natives Sahn, are two islands, 2½ miles S.E. by S. of Poshetra point; the western one is largest, with a flat top, about 60 feet high; the other is a small conical islet. There is good anchorage half a mile east of them, in 6 to 10 fathoms, mud.

To the southward of the Brothers there is an extensive shallow bay formed between Okha-mundel and Halár.

AJÁR is a high bluff island, covered with jungle and a little cultivation. On the south extreme, which is 70 feet above the mean sea-level, is a round hill, on the summit of which are the ruins of an old *Pir*, or Mahomedan saint's tomb. There is a small taláo, or pool of fresh water, on the island after the rains.

Ajár is surrounded by a rocky reef (except in one place on the south-east side, where the mud dries off shore less than one cable's length), and small vessels may conveniently anchor here and get water from the island. The high water mark on this south-east side is white sand, and a small creek runs into the island, from which, through the centre of the island to the taláo in the northern bight, is all a swamp.

Ajár reef extends off the island in a westerly direction 2½ miles, or till due south of Chúsra: beyond it there is a passage three-quarters of a mile wide, between it and another reef lying nearly 2 miles east of the Brothers. The west sandy extreme of Bida seen to the right of Chúsra trees, leads clear through this passage into Pindára bay. With the west end of Chúsra on with the western extreme of Bida, a vessel would ground on the east edge of this detached reef, which shows two dry sand-heaps after half-ebb.

Sunken Rock.—Between Ajár and Chúsra reefs the passage is 1½ to 2 miles broad, but small reefs intervene. One sunken rock lies three-quarters of a mile due south of Chúsra. Bate fort, just open to northward of Bória sand, leads through the channel between this rock and Chúsra; and Bate cocoa-nut trees on with Bória sand leads a vessel to southward of the rock.

To lead a vessel clear to the westward of this little rock some portion of Bida sand must be seen to the left, or westward, of Chúsra trees.

There is another reef eastward of Chúsra, between Bida and Ajár. Its south end is 1¼ miles from Ajár reef: Poshetra village and banyan trees seen a little open to the southward of Chúsra, leads clear to the southward of it; and the Quoin hill, on with western bluff of Ajár island, clears to the eastward of the reef.

TIDES.—It is high water at Ajár, full and change of moon, at 0 h. 50 m.: high springs rise 14 feet; ordinarily 12 feet; neaps 7 or 8 feet.

VUDDA KUDDA REEFS, between D'húni and Bida islands, are 3 separate reefs with passages amongst them. Between them and the south-east side of Cháuka reef there is a channel one mile wide, but, for want of marks, this should only be used when the reefs are uncovered.

Due South from Chánka the foul ground of the Burál reef extends nearly 4 miles, thus narrowing the channel between it and Vudda Kudda reefs to less than one mile; the deepest water is near the latter reefs, the sand-heaps on which are dry soon after high water. The beacon on Búbasir should bear to the northward of N.E. by N., to lead a vessel clear of the projecting reef south of Cháuka island; but, in passing over this 3-fathom mud flat, care must be taken to avoid the little sunken rock which lies 2½ miles South of Búbasir rock.

On each of the Vudda Kudda reefs there is a sand-heap that dries before the rocks; that on the centre reef is only covered at high water springs.

Sunken Rock.—The east end of Vudda Kudda reefs is 5 miles S.S.E. of Chánka; and, about a mile to north of their eastern sand, there is a sunken rock, which is 2½ miles due South of Búbasir rock. Deep water lies between this sunken rock and Vudda Kudda reefs, along the north side of whose sands a vessel should pass at the distance of half a mile.

GUNJÁO KUDDA is an extensive bank to the southward of Vudda Kudda, and on the west of D'húni. There is a boat passage all round it, and, with a pilot, a large ship could be taken within 3 miles of the Round hill, which is situated to the westward of Seraia. Coasting craft pass at high water between Vudda Kudda and Gunjáo Kudda, but the water is shoal in mid-channel.

The HALÁR COAST.—A Runn or salt marsh separates Okha-mundel from Halár, and, during the S.W. monsoon, it is overflowed by high spring tides, presenting then an almost impassable salt swamp, and only divided from the sea near Mudhi, a few miles to the south of Dwarka, by a narrow neck of sand.

Pindára village, situated at the eastern side of this Runn, is the frontier town of Halár, and bears S. by E. ½ E. 7½ miles from the Brothers. The extensive bay between Poshetra and Pindára is very shallow; the mud uncovers at lowest tides for nearly 1½ miles off Pindára, and a depth of 3 fathoms at low water is not found within 5 miles of that village.

The Quoin, the westernmost hill of the high land south of Ajár, stands 140 feet above the sea, from which it is less than one mile distant. On the west of it, the country, towards the higher table-land of Okha-

mundel, is low and swampy for some 10 miles, except in the vicinity of Pindára village, which bears from the Quoin about W.S.W., nearly 4 miles. To the north and east of Quoin hill there are many little rocky pieces of land rising up out of this swamp, the sea face of which is fringed with mangroves.

Black Bluff, the north-eastern piece of the above detached land, 3½ miles S.S.E. from Ajár, and the same distance N.E. from the Quoin, is conspicuous, being 60 feet above the sea, and its east end is a well defined black bluff. To the east of this bluff the mangrove swamp continues for 6 or 7 miles; then slightly elevated country to Seraia bunder, which is 13 miles east of Black bluff. The highest part of this elevated country is a round hill, about 50 feet above the sea, situated 6 miles to southward of D'húni island, and the same distance to westward of Seraia bunder, and 10 miles to the eastward of Ajár.

Seóri is a little rocky islet, standing out of the mud which dries at low water, at the distance of 2½ miles south of Ajár, and 1½ miles W.N.W. from Black bluff; there is a very narrow passage between Seóri and Ajár shoals, unfit for navigation; but the largest ship could approach Seóri within half a mile on its north-west side, to which there is a fair channel with deep water from seaward. To the south-east of this little rocky islet there is a detached piece of land, similar in extent to Black bluff, but not so elevated.

The intricate navigation of these channels amongst the islands and reefs, between Bate and Chánka and the Halár coast, requires the aid of a local pilot, who may be obtained at Kutch Mandavee.

WINDS AND WEATHER IN THE GULF OF KUTCH.

In the Gulf of Kutch Westerly winds prevail from February to October inclusive, and North-easters in November, December, and January.

In the latter month it occasionally blows fresh, but for never more than two or three days at a time, followed by light winds and calms, or light sea breezes in the afternoon. The barometer rises with these strong North-easters, and falls before Westerly sea breezes.

In the latter end of the month of January and beginning of February, dense banks of fog are frequently seen at early dawn on the horizon, after a calm night; when the sun rises, these drift to sea with the land winds, and are blown back with westerly winds, obscuring all objects. They generally come in heavy detached masses, wetting everything, and almost obscuring the sun, which, however, shines out with apparently greater warmth during the intervals. These fogs may be expected until the latter end of February, and are invariably wet. The same prevail on the coast of Sindh at that season.

From the first week of February, fresh breezes from West to South-west may be expected; these are indicated by a slight fall in the barometer, and last for two days, succeeded by calms or light winds. And although North-easters may still blow occasionally after this date, it is but seldom, and only as a land wind, in the morning, or after midnight; and a slight rise in the barometer precedes them.

After the beginning of March the Westerly winds may be said to have fully set in; and now calms and light North-east winds are of only occasional occurrence. Towards the vernal equinox, or some time in the second or third week of March, there are one or two days in which thunder and hail-storms happen at the head of the Gulf, in heavy squalls from South-east to North-east. The barometer gave no warning of these.

In April, Westerly and W.S.W. winds prevail, being strongest in the afternoon as a sea breeze, and moderate from midnight till the next forenoon.

From the beginning of May the heavy South-west monsoon swell has commenced at the entrance of the Gulf, and it becomes a difficult matter to work round the north-west point of Okha-mundel from Bate to Dwarka, even with the strong ebb tides that prevail in that locality; for the swell on the Gurúr shoal is so heavy and confused. Only the larger sort of Kutch kótias attempt it after the middle of May, and they have to lie inside Bate and take advantage of any break in the strength of the wind to try and get out.

From June till the end of August the S.W. monsoon blows with more or less strength, sometimes amounting to a fresh gale. Heavy rain seldom occurs before the middle of July, and sometimes later, though after the end of June frequent showers happen. After the middle of August the most enterprising of the Kutch boatmen leave Mandavee, and lie at Bate, looking out for a break in the weather, which they take advantage of, and make the passage to Bombay in three or four days. The first arrivals at Mandavee from Bombay after the S.W. monsoon, are in the first week of September. After the middle of that month the wind gets considerably weaker, and hauls to about W.N.W. towards midnight. But not until October, when they haul more to the Northward and become decided land winds, can a vessel fetch out of the Gulf from Mandavee on one tack without going to Bate.

In the beginning of November land winds may be looked for with certainty, and frequently are of moderate strength. After the middle of the month they blow fresh occasionally, sometimes lasting all day; but, when the forenoon is calm, the sea breeze may be looked for soon after mid-day.

On November 21st 1851, a heavy gale from South-east and South was experienced throughout the Gulf, and many boats were wrecked and

foundered. It first commenced as a North-east fresh breeze at daybreak, (during the previous night there were light squalls from all quarters,) the barometer was then much the same as the day before, but afterwards fell, instead of rising, towards 10 in the forenoon, by which time the wind had gradually hauled to S.E. and become a moderate increasing gale. Rain likewise fell. From 11 h. a.m. to 3 h. p.m. the wind was strongest, blowing a strong gale at times, in squalls with rain.

Towards evening the wind had veered to South-west, and decreased to a strong breeze, but occasionally blowing a moderate gale in squalls. During the night it gradually veered to North-west, at the same time decreasing, and the sky clearing, and at daylight the wind was North, but only a fresh breeze.

The barometer was lowest at 2 h. p.m., and after that hour rose rapidly. In the forenoon of the 22nd it was as high as it had been 6 days before.

In December the North-easterly winds occasionally blow fresh, but for never more than three or four days at a time. In the afternoon they are very weak, and sometimes there is a calm, or a very light sea breeze.

Passages.—During the S.W. monsoon, frequent breaks in the weather occur to enable boats to run between Mandavee and Bate or Seraia, and between Toona and Júria, but these only last a day or two at a time.

From November to January the North-easters blow fresh outside the Gulf; and it is prudent for vessels, wishing to work into it, to anchor for a few hours off Dwarka, or Kutchigud, should it be ebb tide, and start with the flood across the mouth of the Gulf, to make the Kutch coast, where the water is much smoother.

A course N. by W., or, with spring tides, perhaps a nearly North course from Kutchigud point may thus be made good, leading a vessel nicely between the Gurúr and Lushington shoals towards the Kutch coast, along which she may continue working to the eastward; or, if the wind be light, she may anchor to wait for the next flood tide, or till she can make head against the ebb.

CHAPTER X.

COASTS OF KUTCH AND SINDH.

MANDAVEE TO KARÁCHI.

Mean Variation, 0° 30′ East in 1865.

THAT part of the Kutch coast which is outside of the Gulf of Kutch, together with the coast of Sindh, make a distance of 200 miles from Mandavee to Cape Monze, or Ras Muári. The whole of this seaboard from Mandavee to Karáchi is low, and in many places swampy, and not visible from a vessel's deck when she is as near the land as safety permits. The Kutch coast, which is between 60 and 70 miles in length, has 2 or 3 hills which are good landmarks; but the Sindh coast, for more than 100 miles, has none whatever. The February fogs of the Gulf of Kutch also prevail along this coast.

COAST of KUTCH.—The soundings off the Sindh and Kutch coasts are now accurately laid down on the charts, and cannot fail to be an excellent guide for the mariner. Vessels, not going into the Gulf of Kutch, will find this chapter a continuation of chapter 8, wherein the Gurúr and Lushington shoals are described (*see* page 196).

The coast of Kutch is about 40 miles to the northward of Dwarka point, and from that point (which has so excellent a landmark as the great Jigat temple, visible 17 miles) a vessel, bound to Karáchi, after having hugged the Katiawar coast in the N.E. monsoon, should take a fresh departure. The 30-fathoms line and the 20-fathoms line of soundings, between Dwarka and the Swatch-of-no-ground, are very close together, and the 15-fathoms line is very close within the latter sounding; then the depth more gradually decreases to 10 fathoms, which depth of water runs along on a tolerably straight N.W. bearing from Lushington shoal to the Kediwári mouth of the Indus.

But, as depths of 10 fathoms are found on the bank which extends a dozen miles to the south-west of Lushington shoal, it is a safe rule, not to bring Dwarka temple to bear southward of E.S.E. while it is in sight from aloft; or, if at night, till you reckon the vessel to be more than 20 miles on that bearing from it; thus you will pass over the deep water

between it and the Lushington shoal, and get soundings with the hand-lead on the bank to south and west of the latter. Then, proceeding onwards across the mouth of the Gulf of Kutch, do not shoal your water under 15 fathoms till in the latitude of Kutch Mandavee, when you will be to northward of all out-lying shoals, and will find an extensive flat (having 15 to 12 fathoms) right onwards to the edge of the Swatch, in which deep gut you will not be able to get soundings with the deep-sea-lead if the vessel is not hove-to.

Mándavee and Assar have been described in the previous chapter; the latter is between 8 and 9 miles west of the former. The Lushington bank, which is 33 miles W.S.W. of Mandavee, is the only danger off shore, besides the Ranwára shoals.

To a vessel approaching the coast of Kutch in the vicinity of Assar pagoda, and several miles west of it, two very good landmarks are visible in clear weather; a round hill called Nanáo, or Nunnomár, bearing due North 22 miles from Mandavee lighthouse; and a sharp peak, called Kéri Kubbah, bearing N. ¾ E., 18 miles from Assar pagoda.

TIDES.—All across the mouth of the gulf the bottom is very uneven, and the rapid tides cause a very confused breaking sea, even in a depth of 30 fathoms.

At Assar point it is high water, on full and change, at 12 h. 0 m.; ordinary springs rise and fall 12 feet; very high springs 15 feet; on the neaps, about 8 feet; velocity, 3 to 4 knots per hour.

When crossing the mouth of the Gulf of Kutch, great care should be taken to make due allowance for the set of the tide. Off the mouth of the gulf it is high water, at full and change, at 11 h. 30 m.; flood sets East, 1 to 2 miles per hour, and ebb West about 1½ to 2½ miles per hour, just outside of Lushington bank.

By night.—Ample allowance should be made for the tides when making Dwarka point from the northward at night, vessels should shape a course to pass full 10 miles clear of it. The soundings are no guide, as you may have 18 fathoms at 2, at 10, and at 17 miles off; but, within 10 miles, the bottom changes from mud to sand and shells; and near the shore it is all coral: for which reason there is no good anchorage in the vicinity of Dwarka.

The COAST westward of Assar,* trending N.W. by W., almost straight for 43 miles to Gooria, or Jakáo creek, is uniformly low, and protected from the sea by a narrow sandy ridge, averaging 30 feet in height. Villages are numerous, and the land well cultivated. The water gradually becomes shallower, to a greater distance off shore, in going to the north-

* *See* Chart:—Sindh and Cutch coast, No. 42; scale, $m = 0{\cdot}11$ inches.

west; but no dangers of any kind exist, and vessels may stand in to any convenient depth, as it shoals very gradually, except in the vicinity of Assar. The bottom is either mud or black sand, and very good holding ground.

GOORIA, or **JAKÁO** creek, may be known by a small mound at its entrance, in latitude 23° 16′ N., longitude 68° 34′ 15″ E. The least water on the bar, at low water springs, is 5 feet, with a rise and fall of 8½ feet; high water, full and change, 11 h. To enter the creek, small vessels, or boats, must cross the bar with the mound bearing N.N.E. ½ E., and keep in that line till the point eastward of the mound bears N.E. by E.; then stand for the latter point, keeping 100 to 150 yards off shore, and, when abreast of it, you may go away East for the deep-water point on the south side of the river, and bring up in 3 or 4 fathoms. At the distance of one mile above deep-water point there is not more than 5 feet at low water, but the native boats proceed 3 miles further up to discharge and receive cargoes. The town of Jakáo is between 3 and 4 miles further still from the bunder. At Gooria creek the eastern delta of the Indus terminates.

From Gooria to the north-west the coast line is much indented, the land is very low and intersected with creeks, the mouths of which are shallow. The shoal water line trends pretty straight North-west for 20 miles to the entrance of Lukput river.

KORI, or **LUKPUT RIVER.**—The Kori is by far the broadest of the Indus mouths, being 3 or 4 miles across in a length of 30 or 40 miles, and therefore more properly described as an arm of the sea. At the mouth of this river, in 3 fathoms, the low land is not visible from the deck: but, if the weather is clear, a table-hill, called Munnerah, may be seen bearing E. by N.; the banks are very extensive, and, from the absence of land-marks, it is impossible to give any direction for the navigation.

The river is navigated by a few native vessels as far as Lukput, which was once a place of great trade; but, since the communication of the river with the Indus was cut off, partly by the artificial erection, and partly by the natural formation of a great embankment, called the Ullah Bund, its trade has dwindled away, its houses are tenantless, and altogether it presents an aspect of melancholy and decay. The Kori and Seer rivers have been surveyed as far as they are navigable, and the creeks between those rivers and the P'hukkar river, connecting the Seer with the Indus, and thus forming a direct inland water communication between Jakáo and Karáchi, have also been examined,

The least water on the bar of Lukput river, at low water springs, is 6 feet, with a depth inside varying from 9 to 3 fathoms. The breadth of the river from bank to bank is about 3 miles, but the channels are contracted to about one mile on the bar.

TIDES.—High water, full and change, occurs at Kótasir, inside the river, at 11 h. 15 m.; rise and fall 10½ feet. At Lukput, more than 30 miles from the mouth, high water at 12 h. 15 m.; rise and fall 12 feet; set of the tides about N.E. and S.W., velocity 2 to 3 knots per hour.

From the bar of the Kori river to the mouth of the Seer the course is N.W. 12 miles; the land between the rivers is all low, covered with brushwood, and only just visible from the deck of a vessel in 4 or 5 fathoms.

The SINDH COAST commences with the north bank of the Kori, and takes a general N.W. by W. direction for 60 miles to the mouth of the Kediwári, where it trends about N.N.W. 50 miles to Karáchi. The shore is low and flat throughout, and at high water is partially overflowed to a considerable distance inland. With the exception of a few spots covered with jungle, it is entirely destitute of trees or shrubs, and nothing is seen for many miles but a dreary swamp. Wherever this occurs the land is scarcely descernible two miles from the shore, except where bushes exist, and they can be seen at double that distance, and at low water, when of course it has 6 or 8 feet more elevation, they are visible 5 or 6 miles.

On a coast so devoid of objects, and sometimes partly submerged, it is often difficult to distinguish the different mouths of the Indus, and but few directions can be given to assist the navigator in finding them. The Seer is known by some sand-heaps topped with bushes on its north point, which are sufficiently elevated to be visible some distance; the Kutch pilots call this point Doupe, and always stand in to sight it before they steer for the Munneja bank. There is a similar spot at the Richel mouth, which also serves as a guide to approach the Hajámri, whose changing mouth lies from 2 to 4 miles to the south-west of the trees.

The coast of Sindh is everywhere low, and difficult of approach for vessels of a deep draught; a narrow belt of sand-hills generally forms the sea face, backed by dense patches of mangrove jungle. Of these bushes there are several varieties, Jimmer, Char, and Carree,—native names. The former is extensively cut as fuel for the Karáchi mart; the latter is used by the Mohanee tribe for the preparation of charcoal; the bark is also valuable for tanning purposes. Beyond these sand-hills and mangroves little else meets the eye of the passing mariner. During the heat of the day a peculiar haze hangs over the land, which makes it difficult to recognize even these more than 4 or 5 miles off. It was found from actual observation that the flagstaves could be seen double the distance in the mornings, or before the light alluvial sand was sufficiently dry to be moved by strong winds, for the air generally holds it in suspension when the fresh breezes prevail.

Few supplies of any kind can be procured near the coast. Wells of brackish water may be found a short distance from the different mouths.

In the vicinity of Karáchi the land is higher; and, westward of that place, the high range of mountains, terminating in Ras Muári, unmistakeably point out the west extreme of the Sindh coast, and may be seen in clear weather many miles off.

The RIVER INDUS.—Some little general description having been given of this noble river in the first chapter, mention need only be made of its 13 or 14 mouths. The main river, after passing Hyderabad and Tatta, divides about 50 miles from the sea into two grand arms, the Buggaur and the Setta. During the dry season (from October to March) no communication exists between the former and the main stream, owing to the accumulation of a sand-bank at the confluence; but the Setta, called also Munneja or Waniáni, pursues the same course to the ocean as the great river, having its efflux by the Kediwári and Kukiwári mouths, whose entrances with their impetuous currents and shifting sands are carefully avoided by coasting craft, which make use of the Hajámri and Júa.

Tides.—The descent of the Delta must be great, as the tides are not perceptible more than 30 miles from the ocean; and so feeble is the flood, at the distance of 10 miles above the bar, that vessels scarcely swing to it; the ebb, on the other hand, recedes with terrific violence. Outside the reefs the rise and fall at the springs is from 9 to 10 feet; the first part of the ebb runs to the south-west; as the reefs become dry, it changes its course to the north-west, in a parallel line with the coast. Away from the influence of fresh water discharge, the tide streams are weak and irregular, and much acted upon by the prevailing winds; in fact, the fishermen observe they have but one high tide in the 24 hours; in the fine season the night tides are highest.

Seer Mouth.—The bar of the Seer river is in latitude 23° 34′ 30″ N., longitude 68° 6′ 40″ E. A long narrow spit, mostly dry at low water, extends 6 miles from the north bank of the river, on which the sea generally breaks very heavily. The channel runs along the eastern side of this spit, with a depth of 2 to 4 fathoms; the least water on the bar is 5 feet, with a rise and fall on the springs of 11 feet. High water, at full and change, 10 h. 30 m.

The Seer is navigable for nearly 50 miles from the bar, with a general depth of 3 and 4 fathoms, and nowhere less than 1½ fathom. The connection between the upper waters of the Seer and the Indus is cut off by a bund, or embankment, at Mughrabeen, constructed for the purpose of confining the water of the Gungra, which otherwise was not sufficient for

the irrigation of the land on its banks. Consequently all the land between Mughrabeen and the sea, in fact from Lukput river to the Indus, is a vast expanse of desert land, in many places as level as the sea itself. The lower waters of the Seer are connected with the Indus by the P'hukkar, apparently a good navigable river, but it has not been explored. At Juggi, the furthest navigable point of the Seer, it is high water at 1 h. 30 m. ; rise and fall 6 feet. Off these rivers the tides at the bars set fair in and out, and at 10 or 12 miles off the ebb sets W.N.W., and flood E.S.E., about 1½ miles per hour on the springs, but much weaker on the neaps.

The SWATCH of NO-GROUND.—At the distance of about 35 miles West of the Seer mouth, and about a dozen miles to the southward of the little sandy islet that marks the south end of the great Munneja bank (between the mouths of the Kahá and Kukiwári) the chart shows the northern extreme of that singular deep chasm in the ocean bed, called the Swatch ; so named after the similar one off the Sunderbuns of Bengal, about midway between Point Palmyras and the coast of Chittagong.

The Swatch is a narrow gut of very deep water, from 3 to 5 miles in breadth, extending in a north-easterly direction from the deep sea to within 15 miles of the Mull mouth, and looking like a seaward extension of one of the great arms of the River Indus below the city of Hyderabad. In the upper or northern part soundings may be obtained from 50 to 100 fathoms : but none in the lower part at 200 fathoms. On the north-west side the soundings are from 30 fathoms, at the distance of 20 miles from the coast, to 50 fathoms about 45 miles off; but the south-east side is much shallower, having only about 20 fathoms within 2 miles, and decreasing to a flat of 14 to 16 fathoms, mud ; this flat extends to a distance of 50 miles off shore, and is connected to the Lushington shoal and to the coast of Kutch ; the natives call it the Lukput or Kori bank.

The Kori great Bank, or the Sindh-Kutch bank of soundings, has 20 fathoms at the distance of 60 miles to south-west of the mouth of the River Kori, or Lukput, which is the boundary between Kutch and Sindh ; thence it gradually shoals towards the coast, having soundings of 10 fathoms at about 20 miles off. On this great bank to the east of the Swatch, there are little patches of 12 or 13 fathoms, here and there, some even near the outer edge of the bank, or 50 miles from the coast ; and about 5 miles outside of them a depth of 50 fathoms is found ; thus showing the west edge of this bank to be very steep-to.

The COAST from Seer river mouth trends N.W. by W. 37 miles to the projecting point between the Kahá and Kukiwári mouths ; off which point, about 3 miles, lies a sand-bank, which is almost always dry in the fine season, and marks the south part of the Munneja bank. The sound-

ings are regular throughout: vessels may stand into 4 fathoms (low water) with safety. The Wári, Mull, and Kahá rivers are included in this space, but they are without any landmarks, and not navigated at present by native vessels. Towards the Munneja bank the soundings become deeper, and vessels should not stand in under 7 fathoms, as the edge of the bank is steep.

The MUNNEJA BANK extends 6 to 7 miles off shore, from the principal mouths of the Indus, and occupies a sea face of 20 miles in extent, between the Kahá and Júa mouths. It is formed by the alluvial deposits of the River Indus, the sea face having the usual fringe of hard sand; the western edge of the bank is very steep, having 5 fathoms at one mile, 8 at two, and 10 fathoms at three miles distance. The ebb tide rushes out strong, causing a high ripple, which would very probably be mistaken at night for shoal water; particularly at the junction of the salt and fresh water, the sea has a whitish and sometimes at night a luminous appearance. During the inundation the water is frequently fresh at the mouths of the river; and a vessel at anchor will often have good fresh water, though muddy, on one side, and clear salt water on the other; the boundary line of the two waters is observable several miles out at sea.

The KUKIWÁRI is the southern mouth, which discharges over the Munneja bank a great body of fresh water, but no mention is made of it in the report, from which these remarks are taken. One account states that the River Indus was entered by the Hajámri channel until 1854; since then the waters have forced their way to the southward, through the Kukiwári mouth.

The KÉDIWÁRI is the main branch of the River Indus, discharging the greatest body of fresh water. This mouth, which bears N.W. by W. 12 miles from the Kahá mouth, altered its bearing six points southerly from the Kédiwári beacon during the inundation of 1848: the channel is altered every year, so it is needless to describe where it used to be. The bar itself is composed of fine alluvial sand, apparently hard, and offering great resistance, but readily yielding to the force of the capricious and ever-changeable stream: these hard sand-banks only exist in the vicinity of strong currents.

At various parts of this extensive shoal, distant from the immediate influence of discharge, there was found mud stratum so thickly deposited, that a boat's oar might be forced down its whole length with apparent ease. Some parts of these banks are more elevated than others, evidently increasing from sand-banks to islands of more permanent formation, with an upper stratum of mud and long grass. During the swell of the Indus,

and at high tides, the surrounding country is nearly submerged; the cultivators raise *bunds*, or embankments, round their huts, and are not unfrequently 2 or 3 feet below the surface; at times they are driven to their boats, seeking refuge in more elevated parts of the Delta.

Since the Survey made in 1837, that part of the shoal in the vicinity of the old Kédiwári mouth has increased some distance upon the ocean. This of course might be anticipated, considering this has been the main embouchure for a period of no less than seven to eight years; and the immense quantity of alluvial deposit held in suspension, with the enormous discharge, would, upon a shoal coast like that of Sindh, effect some changes. This was written in 1849; since then much change must have taken place.*

Vessels passing up and down the coast in the vicinity of the Kédiwári shoal, should not approach nearer than 10 fathoms water. The breakers or surf, although indicating approximation to the shore, are no sure guide during the months of November and December. The surveyors frequently landed upon different parts of the reefs and coasts, without experiencing a ripple or a wave; at other intervals the breakers are heavy, and may be seen and heard some distance in the offing

The coasting craft invariably avoid the Kédiwári mouth,—impetuous currents and shifting sands are dangers they are not disposed to encounter. Sharp vessels, grounding on such a locality, seldom escape serious disaster, a few hours being sufficient to engulph them in a bed of sand, from which no human aid or skill can extricate them.

The projecting point of coast, between the Kédiwári and Hajámri mouths of the river, was marked by a beacon; and another beacon marked the Hajámri entrance, but this fell down early in 1856, and had not been put up again in March 1857; its position is in latitude 24° 13′ 20″, longitude 67° 20′ 10″, bearing East about 2 miles from the bar. The entrance was then narrow, and divided into two channels, with a depth of only 3 feet at low water springs.

The HAJÁMRI, in 1846,† emptied itself into the sea by the same channel as the Kédiwári, but in 1849 it was found to have turned northward, and, after joining the Richel waters, to enter the sea about 8 miles to the north-west of the Kédiwári beacon. The beacon at the mouth of the Hajámri was 7 miles N.N.W. of the Kédiwári beacon. The Richel trees are the best landmark for the Hajámri.

The Hajámri and Júa mouths, during the low season, are independent of fresh water discharge, rendering them safe channels for ingress or egress,

* Fenner's Memoir on Tidal Channels of River Indus, 1849.

† *See* Chart :—Tidal streams of the Indus, No 41; scale, *m* = 0·5 of an inch.

and are those generally frequented by native vessels trading by the Górabee channel. Although these mouths offer no immediate impediment to vessels drawing not more than 6 feet, still, like all the rest, they are entirely destitute of beacons or natural landmarks so indispensable for the safe guidance of the mariner.

Tides.—Off Hajámri mouth it is high water, at full and change, about 9 h. 40 m. : rise and fall 8 feet, at ordinary springs ; but 9 or 10 feet sometimes.

Indus Steam Navigation.—After coming down the main branch of the Indus, from Hyderabad, the river steamers debouch at the Kédiwári mouth, then enter the Richel, and navigate towards Karáchi by the Búa, the Júa, the Górabee, the Dubba, the Mull, the Kalarí, the Pitiáni, the Ràhu or Piti, the J'hiri, the Cháru, the Kadru, and the Gisri, where the creek navigation unfortunately terminates, about 3 miles short of Karáchi town. Now that a small class of steamers, to which these mouths are available in cases of accident, also the Indus steamers to and from the port of Karáchi, are trading along this coast, it is important to navigation that these places of refuge be made known and properly beaconed.

The RICHEL, a considerable stream, to the northward of the Hajámri, has now a common embouchure with the latter ; on the north of its entrance, there is a grove of trees (Richel grove) which forms a good landmark, as there are no others so high in the vicinity.

The JÚA, or Sísha mouth is 5 miles N.N.W. of the Richel grove.

The COAST.—Between the Hajámri and Manóra point the coast is all low, intersected by numerous channels and creeks, which afford a safe, though rather circuitous communication between the main river and Gisri bunder, at all seasons. As none of the mouths of these channels are navigable except for vessels of very light draught, and moreover are not marked, being subject to annual changes, it is unnecessary to describe them at much length. The coast line has a general direction of N.N.W. from the northern edge of the Munneja bank up to Manóra point, in soundings from 6 to 7 fathoms ; but vessels may stand in anywhere to 5 fathoms, during the fair season. The bottom is mud and black sand.

Dubba and Górabee rivers now form one mouth ; on the bar there is found a depth of 5 feet at low water.

Pitiáni communicates with the Buggaur or western arm of the Indus. At this mouth little difficulty would be experienced in entering, it being better defined than most of these mouths. This stream discharges fresh water during the swell of the Indus.

Kái is a small mouth leading into the Pitiáni. Upon the left bank of this stream, about 4 miles from its embouchure, is a Belooch village :

here may be found some wells of tolerably good water. The Juts, a migratory race, who graze their camels in different parts of the Delta, not unfrequently bring their fresh water from the mouth of the Kédiwári. When no wells are near, or if they become brackish, the water is filled in the boat in bulk, and deposited in mud bunds or reservoirs near their huts ; this water serves for cattle and domestic purposes.

Kúdi mouth has 5 feet at low water ; its sand-banks are everywhere so low and flat, that this mouth presents a very extensive appearance, adding much to its navigable difficulties. The only natural mark is a high sand bluff on the north shore, about three-quarters of a mile from high water flow. This stream communicates with the Buggaur, and, during the swell of the Indus, discharges fresh water. People are here employed fishing for pearl oysters, with which many of the beds of these tide channels are studded. About 4 miles from this embouchure, on the left bank, is a fishing village, where are some wells of fresh water.

Piti is one of the largest, the deepest, and best defined of these several mouths, and is generally frequented by the Indus steamers to and from Karáchi. On the south side may be seen high sand-hills. Near these are erected two flagstaff beacons standing on an inclined plane ; the upper one is 56 feet, and the lower one 50 feet above the level of the sea : these may be seen in the offing six or seven miles, or in 8 fathoms of water. The true bearing of one flagstaff from the other is N.E. by E., distance 454 feet. By bringing these marks *on*, or in this line of bearing, a vessel will lead in the fair way over the bar, and well up the channel. This course may be steered until the south bank is seen : by keeping in a parallel line with this shore, no difficulty will be experienced.

Gisri mouth is shoal, there being no more than 2 feet at low water. The bar extends for some distance, which makes it difficult of entrance, while inside there are found 3 and 4 fathoms water : this is perhaps the worst defined of the different embouchures. The steamers of the river Indus, bringing produce from the Punjaub, are unable, without going out to sea, to get nearer to Karáchi than Gisri bunder, which places are 4 miles apart ; a very trying and hazardous experiment for the light-draught vessels that are used on that river.

After a careful examination of the several mouths, the surveyor did not succeed in finding the rock mentioned by travellers, as identifying the place of exit of Alexander's fleet : if such rock really existed, the fishermen would not be ignorant of the fact. The closest approximation to the appearance of rocks are those situated 4 miles east of Gisri bunder, abutting the mainland. There are, however, in some of the tide creeks, patches of oysters, but none near the mouths ; and, so firmly deposited are they in the mud, as to offer resistance almost equal to that of a rock.

Those near Wagoda are extensive, and are situated in the middle of the channel.

Ruins.—On the left bank of the J'hiri there are the ruins of a strongly built fort and town; also, on the right bank of the Ráhu, one of similar construction, named Lohári: this is concluded to be the Lohári mentioned by Captain Hamilton, who landed at a bunder of this name, on his visit to Tatta, about the middle of last century. Native tradition bestows very ancient date upon these ruined edifices; judging however from present appearances, it is not believed they have any great claims upon antiquity. The bricks are very similar to those made in the country at the present day; the buildings are of a square form, about 120 yards, with three bastions on each face. From the mass of ruins, several copper coins of various shapes were collected, all apparently of barbarous origin. These places, no doubt, flourished upon the main arm of the Indus, falling into decay as the river assumed a more eastern course.

The SWAMPS of the Lower Indus are less productive, in the way of obnoxious reptiles and quadrupeds, than most large deltas; beyond a few prowling jackals and hyenas, little exists, but in the cold season myriads of ducks, geese, and other water-fowl are seen.

The salt-water worms (Teredo navalis) are destructive, in a most extraordinary degree, to the bottoms of boats, timber, &c. &c. In the short space of six weeks, it was found they had penetrated teak plank fully half an inch. So well aware of this are the fishermen that they lay their boats aground every 10 days, coating their bottoms with fish oil, which is considered by them a good preventive.

KARÁCHI HARBOUR.—This place, increasing daily in importance as the sea-port of Sindh and the Punjaub, is situated near the base of the southern extremity of the Pubb mountains, on a level space intervening between them and the sea. Endeavours are being made to deepen the passage over the bar; in the course of these operations, material changes in the bed of the harbour take place occasionally; but as there is a government port officer, stationed at Manóra, who berths the shipping and attends to their movements, no inconvenience can be experienced.

The population of Karáchi and the suburbs is about 30,000 and steadily increasing with the importance of the place; the Sindh railway bringing it into speedy communication with Hyderabad. The native exports are camels, saltpetre, salt, rice and other grain, ghee, hides, tallow, oil, oil-seeds, salt fish, bark for tanning, alkalies, indigo, cotton; also horses from Cabúl and the adjoining countries. The imports are metals, hardware, cottons and silks, twist and yarn, and recently much railway plant and European goods.

Karáchi harbour is formed by the cliffs of Manóra jutting out from

the low land on the western side, and a sandy spit extending southward from the west end of Kéamári on the eastern side. The width of the harbour varies from 350 to 800 yards, but above the Round tower it is divided into two channels by a shoal called the "Middle ground." To the eastward of Kéamári spit, the water is all shoal, with soundings from 4 to 6 feet.

Manóra Point is a perpendicular rocky cliff, about 90 feet high, forming the extremity of a low sandy ridge, which bounds the western side of Karáchi harbour. In the bay to the eastward there are several rocky islets of the same appearance as the point, but all lower, except the south one. These are known to the natives by the general name of Andái, but by Europeans as the Oyster islands.

LIGHT.—Close to the edge of the cliff at Manóra stands the old fort, with the flagstaff on the south-east angle, and the lighthouse on the south-west. The light is *fixed*, 119 feet above the mean sea level, and visible in clear weather 15 to 17 miles.

The Oyster Islands (called Andái by the natives) are mere rocky islets, with 8 to 10 feet water round them. South island bears from the flagstaff E.N.E. ½ N., rather more than one mile distant, and is about the same height as Manóra cliffs. The others are lower; the centre of the three smallest is called Pyramid rock.

Kéamári Island extends in a direction nearly East and West, 2 miles in length, and 250 to 350 yards in breadth, forming a slight curve, convex to the north. It is low and sandy, with a ridge running along the northern edge. Off the west end, called Kéamári point, the water is deep, having 20 to 23 feet close off the jetty; but the channel is not more than 150 yards broad.

Kéamári point is now connected with the main land by a strong stone causeway, or mole, commenced by Sir Charles Napier, and finished in the year 1853. This work has greatly facilitated the communication with the town and camp, as formerly all goods and passengers were obliged to be landed at the town, which could only be effected at high water, and then only with great trouble and difficulty. The causeway has had the effect, however, of filling up the Town creek, which is now dry all across the mouth at low water springs; and the swamp on the east side of it, which formerly dried at low water, has now a foot to a foot and a half water over it in many parts, as the outlet at the Chinna creek is not sufficient to drain it during the ebb tide.

The channel between Kéamári point and Bába (the fishing village opposite) is divided by a sand-bank with only 1 and 2 feet over it in the shoalest parts.

The Kéamári channel again branches off into the Tookar or Town

creek, the Soti creek (which again divides into the Voyar and others), and the Púhi creek. The Bába channel turns away to the W.N.W., with a considerable depth and breadth for 3 miles, when it gradually diminishes, and is finally lost in a large swamp.

Chinna Creek * opens at the east end of Kéamári island, forming three outlets at half tide, but only one at low water, with $1\frac{1}{2}$ feet on the bar, and 6 to 7 feet inside along the Clifton shore. Manóra fort, seen midway between South and Middle island, is the mark for leading a boat over the bar into Chinna creek.

From the east point of Kéamári the creek runs northerly for about $1\frac{1}{4}$ miles, with depths from 1 to 4 feet; then turns away to the westward, and breaks off into several small creeks amongst the mangrove bushes.

KARÁCHI BAR is composed of sand, extending east from Manóra point; the least water on it is a patch of 7 feet, at the distance of 3 cables' lengths from the fort. The mark for this shoalest patch is Battery beacon (a black-and-white post near Deep-water point) on with Round tower.

A small red buoy, at the distance of 6 cables' lengths from the light-house, marks the end of the bar in 19 feet. A large red buoy is placed in the fair channel, and ships pass between them.

There are two channels over the bar into the inner anchorage; the Eastern,† or deep-water channel, commonly spoken of as Karáchi *bar;* and the Western, or inner channel; the latter can be used with safety throughout the S.W. monsoon by vessels not drawing more than 16 feet, the least water in it being 10 feet at low water spring tides; vessels of light draught may luff in over that part, towards high water, when there is more than 18 feet depth, during westerly winds, by steering N.E. $\frac{1}{2}$ N. for North island, and hauling up North when the flagstaff bears West.

On arrival of ships off Karáchi the water on the tail of the bar is signalled from a small staff to the right of the high flagstaff on Manóra point; this may be reckoned upon as the least water in the Eastern channel between the two red buoys.

KÉAMÁRI SPIT.—A black-and-white *nun* buoy is placed on the tail of this sandy spit in 12 feet. A stone groyne has lately been thrown out from Kéamári point along the spit, which is very soft sand, the surface rather uneven; so that, when partially uncovered, it assumed the appearance of a series of small banks with channels between them. The tides ran strong over this bank, in a direction E. by S. and W. by N., until it became nearly dry.

MIDDLE GROUND.—A black-and-white *nun* buoy is also placed on

---

* This outlet has now been closed.

† Reported to have now a depth of 26 feet at high water (1865).

the end of the Middle ground in 11½ feet; but, during the fair season, the harbour vessel is substituted. The Middle ground is further marked by three black can-buoys; the depth of water varies from 11 to 5 feet, the bottom sand.

The western side of the harbour is very low, and, above the Old beacon, towards Bába village, is a mere mangrove swamp, intersected with creeks.

TIDES.—The tides off the harbour are weak; the flood sets to the eastward, and ebb westward, about three-quarters of a mile per hour. High water, at full and change, 10 h. 30 m.; rise and fall 9½ feet.

The difference between the times of high and low water on the eastern and western sides of the Napier causeway is about 1½ hours, being later on the eastern side. But there appears to be little or no difference between the time of high water at the mouth of the Chinna creek and in the harbour at the Round tower.

ANCHORAGE off the port may be had with the lighthouse N.E. to N.N.W., in soundings from 7 to 5 fathoms, sand and mud. Very strong westerly winds occur after January, and render the anchorage outside very unsafe.

Vessels should not anchor off Karáchi in the S.W. monsoon, if it can possibly be avoided; but, if it is necessary, the best anchorage is with the lighthouse N.E. by N. to N.E. by E., 1 to 1½ miles off, in 7 to 8 fathoms, sand and mud. A long scope of cable should be veered at once. The *Sea Queen* lost two anchors, and the *Ann Black* and the *Eliza* each lost one, in the year 1854. Vessels should not anchor anywhere to the southward, however fair the weather may appear.

DIRECTIONS for KARÁCHI HARBOUR.—In the fair-weather season, after passing Munnejah bank, in 10 to 12 fathoms, the coast may be approached anywhere to 5 fathoms, and good anchorage may be obtained, if required. Manóra point will generally be seen from 15 to 16 miles off, and you may steer for it on any course between East and N. by W.

During the South-west Monsoon vessels should make Ras Muári (Cape Monze) which is 18 miles W. ½ N. from Manóra lighthouse, and keep to windward of the port, if the weather is thick, or if the tide should not suit for crossing the bar. Bear in mind the probability of a strong set to the south-east. Do not bring Manóra point to the southward of East, or go under 15 fathoms near Ras Muári. Near Manóra point a vessel may stand into 10 fathoms. If to the southward of the port, do not go under 8 fathoms, or bring Manóra lighthouse westward of North.

Outward bound in the S.W. monsoon, it is advisable to work off to the W.S.W. into above 15 fathoms, or 10 miles from the lighthouse, before shaping a course to the southward. For although a vessel might

lie along shore, direct from the mouth of the harbour, she would be very likely to get into difficulties, from the wind falling light, or the flood setting in towards the mouths of the rivers. In passing the Munnejah bank she should not be in less than 20 fathoms, or not more than about 2 miles east of the meridian of Manóra point.

The S.W. monsoon seldom blows hard in the vicinity of Karáchi. The general direction is West to W.S.W., liable to squalls from N.E. and S.E., with rain, particularly in July.

GENERAL REMARKS.—Masters of ships leaving England, or any other port, bound for Karáchi, will do well to bear in mind, that during the months of June, July, and August, and part of September, no ship should arrive off Karáchi with a greater draught than 17 feet; as ships more deeply laden than that are apt to bump on crossing the bar, and to do serious injury to themselves.

June, July, and August at Karáchi are the S.W. monsoon months, when there is often bad weather, and always a troublesome sea. Ships arriving, or expecting to arrive, off Karáchi, during the above months, should not anchor in the Outer roads, if it can possibly be avoided by keeping off and on until the high-water time permits their crossing the bar. Many ships have lost their anchors by anchoring in the Outer roads during the S.W. monsoon.

The depth of water on the tail of the bar is always signalled to every ship on arrival, from a small flagstaff on Manóra point, a little to the right of the high flagstaff; and, if practicable, a pilot is always sent off to conduct ships over the bar to the anchorage.

Ships arriving off Karáchi from the middle of September to the end of May, may draw as much as 19 to 20 feet, but not more.

Vessels from London, or from the westward of Karáchi, bound to this port, should not in the Westerly monsoon (February to October) make the coast of Sindh and Kutch, or any of the contiguous land whatever, previous to sighting Karáchi lighthouse; but should they do so, and have to beat up to Karáchi, they will find the entire coast (with one or two exceptions, which have been specified) a perfectly safe one to approach.

No attempt should be made by strangers to cross Karáchi bar at night; only steamers do it with old practised hands. If the weather permits, a pilot usually comes off to take the ship in; but, in case one does not, the following directions will, if attended to, enable the master of any ship to take his vessel in himself.

Eastern Channel.—To enter this channel, steer up with the Middle island and church in one, or bearing N.N.E. ½ E., till the little staff, on which the bar-soundings are signalled, is in one with the high flagstaff; then haul up North, passing between the two Red buoys off the

tail of the bar, till you get the Old beacon on with the right side of the Coal-shed, which will lead clear up channel in not less than 14 feet, low water spring tides.

The large Red buoy off the tail of the bar is in the fair channel; the small Red buoy, with a staff on the top, marks a 9-feet patch, at the extreme tail of the bar; so do not come too close to it.

Western or inner Channel, which is not used by large ships, runs over the bar in a N.N.E. direction, a few hundred yards from the cliffs of Manóra point, and in all weathers is a very safe channel; and it makes a short cut to the anchorage compared to the Eastern channel. The least water in the inner channel at low water spring tides is 10 feet. The channel has not as yet been buoyed, but the following are safe marks for using it:—Bring the Triangular beacon (which is a mast, 50 feet high, with a triangular grating on the top of it), on the eastern end of Kéamári island, on with the centre of Jacob's Rifle-butt, (a dead wall 100 feet long and 60 feet high on Scandal Point); and any vessel with these marks on will go clear over the bar by the Western or inner channel. It must be borne in mind that, in crossing the bar, it is advisable to keep two hand-leads constantly going; and, as soon as you get a deep cast on the other side of the bar, you must have everything in readiness, and haul the vessel up for Deep-water point at once.

Sailing vessels, having to cross the bar, should have all their gear clear, and ropes coiled down clear for running, as the quick working of a vessel will often save her from running aground.

Deep Water Point is the first sandy point on the left, at the slope of the cliffs, and is easily distinguishable by a small battery which is erected on it, to command the entrance of the harbour. The small beacon near it, marked "Stump beacon" on the chart, is now called Battery beacon. Off Deep-water point the depths are from 6 to 9 fathoms, with rocky ground in some parts. When once fairly into the inner harbour, that is to say, clear over and inside the bar, whether by the Eastern or the Western channel, vessels should make for Deep-water point, after which the anchorage can be selected at discretion, aided by a look at the chart.

The flood tide between the Inner and Outer red buoys (of the bar) sets across the channel to the N.N.E., and the ebb to the S.S.W., for which due allowance should be made in crossing the bar.

INNER HARBOUR.—To reach the extreme end of the harbour, there are two buoyed channels, east and west, round a large sand-bank dry at low water spring tides, called the Middle ground. (*See* page 238.)

If bound up to Kéamári point, the Western channel is generally used. Both the lower buoys may be passed within a distance of one cable's

length; and the upper one at about 1½ cables, and then haul across N.E. for Kéamári. The depths in the channel are from 24 to 17 feet, but in hauling across to Kéamári as little as 11 feet will be found. The soundings off Kéamári point are 3 to 3½ fathoms, and 4 fathoms close to the jetty.

The Eastern channel to Kéamári is considered by some to be the best, there being an average depth of 13 to 15 feet all the way up. After passing Deep-water point, keep to the eastward of the Mooring buoy (red) with the upper Black buoy just open off Bába North point. When at the tail of the Middle ground, you will have Battery beacon between Manóra flagstaff and lighthouse; then stand towards the shipping in the inner harbour, with these last-mentioned marks in a line, hauling a little to the northward when abreast the upper Black buoy, so as to bring the beacon to the right of the lighthouse, and anchor in any convenient position.

The general strength of the spring tides, within the harbour, is about 2 miles per hour; on the neaps about three-quarters of a mile, and sometimes scarcely perceptible. The tides set fair up and down the channels and creeks, except as noted at the Bar and Kéamári Spit buoys (*see* Charts.* Over the flat to the eastward they are very weak at all times. Several charts of Karáchi harbour have been published from time to time, as the alteration of the bar seemed to necessitate. The works now in progress, by which it is hoped to deepen the harbour and bar very much, make great changes in the channels and banks, so no chart must be implicitly trusted. The latest is on a very large scale, in two sheets, by Lieutenant Grieve, I.N.; but, even since this was published, the bar has been found to alter, and luckily, as heretofore, much to its improvement, as the length of the bar appears to be shortened, and the inner channel to have washed deeper; but all above the bar remains as before, and a more precise or beautiful survey of it could not be desired.

The COAST, between Manóra point and Cape Monze (properly Ras Muári), is low and sandy, backed by a range of hills of about 800 feet elevation, which terminate at the cape. The land curves slightly, and all within the chord is foul rocky ground; to avoid which, do not bring Manóra point to the southward of East, or stand in under 10 fathoms, except near Cape Monze, which may be approached to half a mile or 15 fathoms water: the channel between the cape and Churna island is quite safe, with soundings from 9 to 11 fathoms. The Hubb river falls into the sea close to the northward of the cape.

---

* *See* Chart :—Karáchi harbour, by Grieve, No. 40; scale, *m* = 8 inches.

DIRECTION BANK.—The bank of soundings, west of Ras Muári, terminates in longitude 66°, going off abruptly from 60 fathoms; the bottom is all mud south from the cape. Outside of 10 fathoms, off Karáchi, the bottom is all mud, till you come to this Direction bank, of sand and coral, at a distance between 35 to 45 miles south-west of Karáchi, on which the soundings range from 30 to 40 fathoms, sand, shells, and coral. This bank lies north-west and south-east, and is 40 miles long. Inside this Direction bank there is a depth of 43 to 48 fathoms, thence gradually shoaling to Karáchi.

Steering due South from Manóra point, the depth gradually increases, from 10 fathoms at 8 miles off, to 20 fathoms at 35 miles; then very quickly to 40 and 45 fathoms, continuing that depth to a distance of 70 miles, and terminating at the mouth of the Swatch.

RAS MUÁRI, or Cape Monze, which is 18 miles W. ½ N. from Karáchi, is of moderate height, and from it the mountain range gradually rises to the north-east. Off the cape a bank projects 2½ miles to the south and south-west, with depths of 3 to 5 fathoms, rocky ground. The island Chilné, or Churna, of a whitish colour, is situated 4 or 4½ miles to the north-west of the cape.

CHAPTER XI.

MALDIVH AND LAKADIVH ISLANDS.

VARIATION of Compass, 0° 5′ W. to 0° 5′ E. in 1865.

GENERAL DESCRIPTION.—The Maldivh islands, grouped together in clusters called Atolls, extend over a space of ocean which is 470 miles in length, north and south, and 70 miles east and west, or from latitude 0° 42′ S. to 7° 6′ N., and between longitudes 72° 33′ and 73° 44′ E. There are 19 Atolls or groups; in the centre of the chain they lie in double rows —east and west Atolls—with a space between of from 10 to 25 miles; at the north and south extremes of the chain the Atolls lie singly.*

Barrier reefs encircle those Atolls which compose the southern half of the Maldivh group, but none of the Atolls north of latitude 3° 30′ N., have them, excepting in a few detached parts of their circumference.

The islands are in general not more than 5 or 6 feet above the level of the sea, so that the cocoa-nut trees on them appear on first approach to be growing out of the water. No ground is found with the lead at 200 fathoms' depth, close by the sea face of islands and reefs; the descent of their sides is thus very abrupt, but it was never observed that the rock curved in below the surface so as to lessen the base. The natives are of opinion that the islands decrease in number, and gradually waste away; in some the cocoa-nut trees are standing in the sea, in others the submerged black soil of the island is discernible at low water, several feet from the dry beach; the south-east side of an island in Phaidi Pholo Atoll is entirely gone, but marked by a banyan tree in the water.

They say that some islands have disappeared entirely, and they instance, near Waidu island, in Milla-du-Mádu Atoll, a rocky shoal which was once an island. They, however, acknowledge that reefs have arisen from the water, and gradually become habitable islands; and the inhabitants of Máli remember the outer edge of a circular reef in their harbour to have had 2 fathoms' water over its shoalest part, which is now dry at low water.

The whole Maldivh group is inhabited by a civilized race of people, who carry on a considerable trade with the British possessions in India, more particularly with Bengal, Chittagong, Ceylon, and the Malabar coast; and, being Mahomedans, their peculiarly built vessels occasionally make a pilgrim-voyage to the Red Sea. They are expert navigators and sailors; schools

* *See* Charts:—Maldivh Islands, in three sheets, No. 66 (*a*, *b*, *c*); scale, $m = 0{\cdot}25$ of an inch.

for teaching navigation are found on some of the islands. They make and repair nautical instruments, such as the astrolabe and quadrant; they copy English nautical tables, and translate the rules of our navigation books into their own language, generally using our numerals, so nearly identical with the Arabic. They are an inoffensive timid people, and there appears far less crime among them than with more polished nations; murder has been seldom known among them, theft and drunkenness very uncommon; being strict Muselmín, they are forbidden the use of spirituous liquors.

The men in appearance are of a dark copper colour, rather short, and in person not unlike the natives of Ceylon and the Malabar coast, but at Máli many exhibit in their physical conformation an admixture of the African, doubtless from the Zanzibar slaves, occasionally imported by Maskat vessels. Their language is different from that of either Malabar or Ceylon, though it adopts many words in constant use at the sea-coast; their women are not pretty, and, though less secluded than is usually permitted by Mahomedan custom, they are extremely alarmed at the sight of strangers.

These islanders have been more than kind in their hospitality to shipwrecked mariners. This was exemplified in their humane and liberal conduct towards the commander, officers, and crew of two vessels—the *Adonis* and *Vicissitude*—totally wrecked during the night, one on Collomandu Atoll, in 1835, and the other on Heawandu Pholo Atoll, in 1836; nor would they receive any payment, though it was liberally offered by the government of India; presents, however, were accepted as a mark of friendship from the Bombay government.

These islands are governed by a Súltán, whose title and rank are hereditary; under him are six Wazírs or ministers of state, of whom the first in rank is styled Durimind, the chief or general of the army; but above these, and second only to the Súltán, is the Fandiári, the head priest and judge, civil and religious. The Hindigéri, or custom master and public treasurer, is also a very great man; and last of all is the Amír-el-bahr, or master attendant of the port. All these functionaries reside at Máli, or King's island.

To the different Atolls are appointed one or two chieftains, styled Atoll-wári, as also a Katib to each Atoll, who is priest and judge. Every Atoll pays a certain fixed revenue, a portion of their produce, to the government at Máli, and nobody is allowed to trade with foreigners or strangers except at Máli.

TRADE.—The whole of the export and import trade of this group of islands, carried on in foreign bottoms, is conducted at Máli, whither the produce of all the other Atolls is brought, the dealers from each carrying

back in return the produce of other parts to supply the wants of their respective islands. The external trade of Máli consists of two branches, one carried on by traders resorting to that place from Chittagong, Point-de-Galle, the Malabar coast, and occasionally from Maskat; the other by the islanders themselves in their own vessels.

Exports.—The foreign traders call regularly once a year, arriving about March, and leaving with the S.W. monsoon about July. They barter principally for boníto fish (goomal-mutch), of which two or three millions are shipped off every season; Ceylon and Sumátra are the places where the demand is greatest, the latter island being supplied by the Chittagong traders. Tortoiseshell, cocoa-nuts, coir yarn, cowries, and a kind of sweetmeat, and a few mats, compose the other articles of export. The coir yarn of these islands sells at a higher rate than the ready-made rope of the continent, it being much finer, and of a higher colour; the trade in this article is principally carried on in the boats of the islands.

That part of the external trade which is conducted by the natives themselves is carried on chiefly with Calcutta, in boats of from 100 to 200 tons burden; they leave the islands late in August or early in September, annually, having the S.W. monsoon in their favour, and return in December with the N.E. monsoon. These boats, from their build and rig, are totally unfit to work to windward, or even to make moderate progress unless the wind be abaft the beam; but smaller trading boats, of about 50 tons, whose sailing qualities are somewhat superior, are also used occasionally in trading to Penang and Calcutta.

Imports.—The imports are rice, dates, salt, leaf tobacco, betel nuts, coarse white cloth, cotton, red and white check cotton handkerchiefs, curry-stuff, ghee, china ware, Indian pottery, and coarse brown sugar; and in small quantities, steel, brass wire, thread, and waist-cloths of various colours.

The Bengal rupee is the current coin of the islands, and is used in all money transactions. Of cowries, 12,000, constituting one *kota* or *goolah*, can be purchased in the bazár of Máli for one rupee (which will be at about the rate of 500 for an English penny).

PORT DUES and QUARANTINE.—On the arrival of a trading vessel from the eastward near any of the Atolls, a boat immediately puts off to her, and conducts her to Máli; where the pilot receives a fixed remuneration from the Hindigéri. On the vessel anchoring off the town of Máli, the Amír-el-bahr hails the pilot to inquire whether there be any sickness on board. Should there be none, he goes on board, when it is customary to present him with a piece of chintz or a shawl, and he then conducts the master of the vessel on shore. The port-charges and duties are moderate. The sum of 40 rupees is payable by every foreign

trading vessel, without reference to her size, or to the period of her stay; but from a large ship one candy weight of merchandise is exacted in addition.

Besides, there is a duty consisting of 50 bags of rice, which is charged under the name of *hadiyeh*, or presents to the Súltán and officers of government; of this the Súltán receives five and a half bags of rice, with seven red handkerchiefs, to be carried to his palace at seven different periods, the bearers receiving back one handkerchief and a quantity of betel-nuts; the remainder of the *hadiyeh* goes to the officers of government and the Súltán's relatives, according to a list provided by the Hindigéri. These presents may be made either in rice, salt, cummin-seed, chillies, coriander-seed, which are taken by measure; or, in dates, catechu, turmeric and onions, which are taken by weight, six guls (one and a half pounds) in weight are equivalent to 6 bamboos, or 12 seers in measure. The Amír-el-bahr, who superintends this business, is entitled to a sixth part of everything given.

Besides, and on delivery of the above, 40 cotton handkerchiefs are required to be given, the cheapest of any colour being taken without objection. And then there is a small present of five rupees in a handkerchief, required to be sent to the Súltán, after the other presents are delivered, to obtain permission to barter.

Quarantine.—If there be small-pox on board, the vessel is put under the strictest quarantine for 40 days after the recovery of the person last affected. In case the disease was prevalent at the place from which the vessel comes, though there be no sickness on board, quarantine is nevertheless enforced, but the period is limited to what the Súltán may see fit to order.

Natural Productions.—The cocoa-nut palm is most extensively planted; rows of them, with occasionally the aréca, line the roads; the nuts are esteemed superior to those of India, and, besides exporting vast numbers, the natives extract from the nut a kind of sugar called ghoa; the tree grows to a height of 70 to 90 feet, but the banyan tree is the largest on the islands, attaining to a greater height than the palms. The nuts of the aréca palm (betel-nut) are far inferior to those of the continent. Screw-pines yield some fruit. Bread-fruit trees furnish a useful variety of food. Almond and lime trees grow, with plantains and papaws, pine-apples, pomegranates, pumpkins, sugar-cane, sweet potatoes, and some other bulbous roots. Millet is grown to a small extent; but all the rice, which is the first article of vegetable food, is imported. On the southern Atolls there is *least* cultivation but *most* rain.

Cotton is grown in small quantity at some of the islands in Tilla-du Má'i Atoll (*see* page 278). Mats are made of a grass on Suadiva Atoll, but

not in great quantity. Cowri shells (the small money of the islands) are found in myriads. Of living creatures, rats are numerous on the islands and destructive to the cocoa-nuts; tortoises are plentiful at Máli. Flying foxes are very plentiful, so are crows; there is only one singing bird, small and black, called by the natives colea. There are a few snipe, ducks, bitterns, and the usual sea-birds, curlews, &c. Wild ducks come over in great numbers during November, and are caught in nets by the islanders, who consider them excellent food.

Coral fish of every hue abound. The sword fish is common and sometimes found 18 feet in length. Turtle, sharks, and porpoises are plentiful, and from them oil is obtained. The boníto fishery is the chief employment of the islanders, that fish being the principal article of food as well as of commerce; sometimes a thousand are caught by one boat in a day, but 600 or 700 is the ordinary number. Some idea may be formed of the importance of this fishery when we learn that in 1824 (doubtless an exceptional year) no less a number than 7,600,000 were purchased by English vessels alone. At Sumátra, where the demand is greatest, such a quantity would fetch 152,000 Spanish dollars; but the ordinary reward of the fishermen's labour is about one-half the above, and sometimes not one-sixth.

Climate.—The unhealthiness of the climate at the Maldivhs has long been notorious, and is doubtless the great obstacle to foreign intercourse and internal improvement. The cause of strangers losing their health is partly the lagoons and marshes thoughout the islands, and partly the unvarying temperature of the atmosphere. When the surveying vessels first visited the islands in 1834, the S.W. monsoon had just cleared away, and the thermometer ranged between 80° and 82° (*see also* Lakadivhs, page 26). When the violent N.E. monsoon showers set in, it fell as low as 75°, but rose only to 80°; and after that, the range was between 82° and 85°, till after the middle of the year, when the S.W. monsoon (blowing over the sea which has been so much reduced in temperature by the currents from southward of the line) again reduces it to 80° and 82°. These registries of the thermometer were taken in the shade on ship-board.

The sickness, to which strangers are most liable, is a bowel-complaint —a species of *gastro-enteritis*—which appears peculiar to these islands; the only remedy seems to be an immediate departure for the continent of India. The natives also are liable to it, for in one instance nearly the whole population of an island was carried off. With the exception of beri-beri, which attacked the Indian lascars and not the European sailors, there are few other diseases of importance. Ague occurred to those of the surveying party who resided on shore. Amongst the islanders intermittent fever prevails and is difficult to be got rid of; all the British

officers and men who remained on the island of Máli, during a part of the S.W. monsoon, were prostrated by it and compelled to leave.

Language.—Three different kinds of written characters are found on Maldivh tombstones. The most ancient are called Dewehi Hakura, which were probably used by the first inhabitants, but now the knowledge of them is very limited, being confined to a few individuals at Máli; totally forgotten in the northern Atolls, but still retained in the southern Atolls; for the inhabitants of which, orders from the King's island are written in this character, which is written from left to right. The next is the Arabic character, written from right to left. The third, also written from the right hand and called Gabali-Tana, was introduced when the Portuguese garrison at Máli were overcome, and Mohamedanism re-established by a chief and some people from the northern Atolls; it is now the common language throughout all the Atolls, though, as mentioned before, the most southern islanders have a dialect of their own. In consequence of the intercourse with traders from Bengal and other parts the language now spoken at Máli is intermixed with many foreign words; and, though the Gabali-Tana alphabet has only 18 letters, some auxiliary letters from the Arabic and Persian are obliged to be used. Letters of the alphabet are used as numerals, and they reckon by *twelves* as we do by *tens*.

Religion.—These islanders have a tradition that about 400 years ago the Mahomedan religion was introduced by a man from Persia, whose name, or that of the country from which he came, was Tabriz. Some time afterwards Christians, doubtless Portuguese Roman Catholics, came there and propagated the tenets of their faith, but they were soon expelled by a chief who belonged to Atoll Tilla-du-Máti, who re-established Mahomedanism amongst them on a secure footing.

The tomb of Tabriz at Máli is held in great veneration, and kept in good repair. Shortly after his death some of his countrymen came in search of him, remained and died at Máli; their graves are about 60 in number, but only two had legible Persian inscriptions, bearing date 994 of the Hejra, which would correspond with A.D. 1578.

CHANNELS.—Amongst the different Atolls there are good channels for ships, no soundings are obtainable between them, not even close to the outside of islands and reefs. Some of the channels are intricate, and only fit for steamers, as the currents run strong through them eastward or westward according to the season.

Besides the channels which separate the different Atolls, there are numerous openings or gateways (called *bári* by the natives) through their exterior reefs; they are also very deep and used by the Maldivh boats in passing from one Atoll to another, and some will admit the very

largest ships; inside is found safe anchorage in very smooth water of moderate depth, with a bottom of coral and sand.

By day all the channels between the Atolls, and even those amongst the islands and reefs, may be passed through without anxiety, as all the coral dangers under water are visible at some distance from the mast-head.

By night ships ought only to pass through the four larger channels between the Atolls; these channels are as follows:—

1st. **The Equatorial Channel,** between the north end of Ad-du Atoll, in lat. 0° 35′ S., and Suadiva Atoll's south end, in lat. 0° 12′ N. The detached island of Phua Molóku is situated a little to the south and east of the centre of this channel.

2ndly. **The One-and-a-half Degree Channel,** between Suadiva Atoll's north extreme, in lat. 0° 55′ N. and long. 73° 15′ E., and the south extreme of Adu Máti Atoll, in lat. 1° 47′ N. and long. 73° 22′ E.

3rdly. **The Vaimandu Channel,** between Adu Máti and Colomandu Atolls, which is 15 miles in breadth, and in direction N.E. by E. and S.W. by W. Although this channel is safe, navigators would have less anxiety in making for and passing through the channel to the southward of it.

4thly. **The Cardiva Channel** (sometimes called the Five Degree channel), whose breadth is 25 miles; its length, 67 miles; and direction about N.E. and S.W. The island Cardiva lies athwart the way in mid-channel.

AD-DU ATOLL, erroneously called Phoolah Moloque by former navigators, is the southern termination of the Maldivh chain, and the smallest of all the Atolls, being only 10 miles from east to west, and 7 miles from north to south; it is of half-moon shape, concave on the north side. This Atoll is rich, well inhabited, containing about 500 people, and available for ships much in want of supplies. It has nine large and several small islands, the two principal are Hit-ta-du and Me-du (called also Hu-lu-du, both names being those of villages on the same island). Hit-ta-du lies at the north-west angle of the Atoll, Me-du at the north-east extreme, between them there are two gateways into the Atoll along its north concave face.

Gung is the most southern island of the group, its east end lies 8 miles to the south-east of the north point of Hit-ta-du, and on the same barrier reef, which is dry at low water. Eastward of Gung lies Wilin-gili island on a reef of its own, and on either side of it are the two best passages into the Atoll, called Gung and Wilin-gili channels. From the latter one continuous barrier reef extends northward to Me-du, and thence westward to the middle of the Atoll's north face.

Supplies.—The islands afford a few supplies of fruit, limes, poultry, eggs; water and firewood in abundance. The natives are very civil and

obliging, and will exchange their articles either for money or rice, biscuit, sugar, salt, onions, and garlic; they are extremely lazy and indolent, and very timorous, fearful of strangers, and will not be induced to assist a ship in wooding and watering, even if paid for it, unless obliged to work. They are under the government of the Súltán at Máli or King's island; and the Atoll-wari, or chief of the Atoll, is the person to whom strangers ought to apply for assistance in getting supplies. Some of the natives can converse in the Hindustáni, but their proper language is described at page 249. All these islanders are Mahomedans.

Their principal occupation is making cotton cloths of white, red, and black colours mixed, all of which they themselves dye, and sell at a good price in the other Atolls. They are not allowed by their government to trade with foreigners, not even with the English, their allies; all their produce must be sold at the King's island, Máli. They seldom visit ships passing, from fear of molestation, and it would be wrong of any ships stopping at these islands to allow their crew to intrude into the privacy of their houses, among their females, or wantonly and without permission take their fruit, cocoa-nuts, fowls, &c. They are poor and inoffensive, and have reason to regret the visits of some merchant ships.

Passages into Ad-du Atoll.—There are four passages leading into this Atoll; two on the north, and two on the south side.

The Southern openings are broadest and deepest, and may be used at night time, and with a fair tide a vessel could work through them; but the best way is to adopt that opening through which she will have a fair wind. Gung channel is half a mile broad, with no dangers in it, and depths from 13 to 17 fathoms water; about a N.N.W. course leads through. Wilin-gili channel, nearly 2 miles north-east of the last, is one mile broad, and has from 13 to 20 fathoms water, still deepening to 30 fathoms as a ship gets inside; the course through is about N.W., but as a vessel proceeds inwards she will come upon three coral patches in succession, on these the sea breaks at times, but they are easily avoided by a common look-out.

The Northern openings are neither so broad nor so deep, yet are safe and available for vessels coming from the northward with northerly winds, or leaving the Atoll with southerly winds, but they are too narrow to beat through. They are not easily seen by a vessel coming from the north, as the north side of the Atoll appears like one unbroken reef; on a nearer approach, and almost central between the trees of Hit-ta-du and Me-du, there will be seen a small bushy islet and a high bank of coral stones, both on one reef, which divides the two channels. The eastern one, the largest, is between 2 and 2½ cables broad, having not less than 6 and 7 fathoms water, its direction N.W. and S.E. The western channel

is narrower, yet longer, on a North and South course, with depths from 10 to 12 fathoms.

Tides and Currents.—In both Northern and Southern passages, the tides and currents are strong; the flood sets into the northern, and the ebb sets into the southern. High water at 1 h., on full and change, when the rise and fall of tide is about 4 feet.

The currents about this Atoll are very strong, for six months they set westward and then back to eastward, according to the monsoon, but are subject to checks from variable winds. They commence to set westward about January, and eastward about June, with a velocity of from 40 to 50 miles a day, but at some 40 or 50 miles from the islands they decrease considerably in strength.

Anchorage.—No soundings can be obtained outside of this Atoll; but within it, 30 and 35 fathoms are found in the centre, and 20 and 25 fathoms near the islands; the only detached reefs are a patch of 2 fathoms near Mára-du island, and the three patches already described, lying in the centre of the Atoll between Wilin-gili and the Northern channels. Near the west sides of the eastern islands a vessel can anchor in the N.E. monsoon, and on the north-east sides of the western islands in the S.W. monsoon, in smooth water; these are the most convenient anchorages for communication with the natives.

Winds.—Being to the southward of the equator, Ad-du Atoll is almost without the influence of the S.W. monsoon, the winds and weather being very variable, subject to squalls and rain. The N.E. monsoon is felt in January, February, and March (*see* page 26).

PHÚA MOLÓKU ISLAND, to which the name of Addon island was formerly given erroneously by navigators, is situated a little to the south and east of the centre of the passage that is 46 miles broad between Ad-du and Suadiva Atolls, called the Equatorial channel. The island is 2 miles long from north-west to south-east, and on an average three-fourths of a mile broad; the trees are from 70 to 90 feet high. It contains between 300 and 400 inhabitants, who are principally employed in fishing and weaving cotton cloth. Here resides one of the royal family from Máli, who is styled Di-di. From the islanders may be obtained turtle, fowls, eggs, fruit, lime, fire-wood, and fresh water; they often visit passing ships which show their colours. Some can converse in the Hindustáni language.

Phúa Molóku may be approached quite close off the north, east, and west sides, where no soundings can be obtained; but off the south end a shelving bank extends for 1½ miles, on which the surf breaks very high to a distance of three-fourths of a mile from the island; yet, on the extreme verge of this bank a vessel may, in moderate weather, anchor

for a few hours in 6 and 7 fathoms water. The bank is of hard sand with small coral rock, and anchors do not hold well; its sides, like the island, are precipitous.

EQUATORIAL CHANNEL.—By this name navigators in general know the entire passage between Ad-du and Suadiva Atolls, but the island just described lies athwart the way, about half-way between Ad-du and the equator; so that the Equatorial Channel *proper* is between Phúa Molóku and Suadiva Atoll. This channel is free from dangers; a ship passing through, coming from either east or west, ought with light winds to borrow over towards Ad-du, that, in case of calms and variable winds, she may not be drifted too close to Suadiva Atoll; but if this should happen, she might in the daytime easily enter one of the numerous gateways leading into Suadiva Atoll, described at page 254.

Tides.—Currents.—Winds.—It is high water at Phúa Molóku at 1 h. on full and change of moon; the rise and fall is between 4 and 5 feet. The ebb-tide sets to the westward, the flood to eastward; they are little felt except in retarding or accelerating the currents. The prevailing winds are from West to South and S.S.E. from May to December, with much rain and squalls. In the latter month the N.W. monsoon (which prevails for nearly all the first half of the year from the equator to the Chagos archipelago) commences with about a fortnight's hard squalls and fresh gales from W. to W.N.W. with heavy showers of rain; but in January, February, and March the N.E. monsoon blows to the equator, and sometimes a little southward of it, the wind being generally in those months from North and N.E. in the Equatorial channel with less clouds and rain than in the last half of the year.

SUADIVA ATOLL, called by the natives Huahdu, is one of the largest of the Maldivh group, being 42 miles in length North and South, by 34 miles in breadth. Its south extreme is 46 miles to the northward of Ad-du Atoll, but separated from the island Phúa Molóku by only 31 miles, which space constitutes the Equatorial channel *proper*. There are 30 islands in the centre of this group, where there is found a greater depth of water than in the interior of the other Atolls, and it is also less obstructed by coral reefs.

The islands on the boundary are numerous, but only 15 are inhabited. The aggregate population of this Atoll is about 2,000. The principal employment of the men is fishing; that of the women is weaving rush mats for couches, beds, &c. with rushes dyed of different colours, and of pretty patterns; a good mat will sell for from 1*l.* to 3*l.* sterling. The island Gud-du, on the south-east side of the Atoll, is the principal place of their manufacture. The inhabitants of this group are much subject

to elephantiasis, a dropsical swelling of the legs, so common at Ceylon and the Malabar coast, especially Cochin.

Hun-da-du Island, the residence of the Atoll-wári, the chief of the Atoll, is situated at the extreme west of the group, at the north end of a barrier reef, which is 19 miles in length and forms the south-west side of the Atoll. It contains about 200 inhabitants, and good water, poultry, &c. may be procured. In the westerly monsoon good anchorage may be had on the east side of the island in from 27 to 35 fathoms water. Southward of Hun-da-du the barrier reef is thickly studded with islands, which at a distance in some places look like one large island ; there is a projecting elbow of this boundary reef off the island Nunda-áli, which is over 10 miles in a S. by E. direction from Kan-da-du channel ; and from this island the reef turns to the south-east for more than 8 miles to the first of the southern entrances between the islands Má-tura and Fe-ur-wári ; this last island, which terminates this south-west barrier, is well inhabited, and has good water.

Má-tura, the most southern island of the whole Atoll, lies to the eastward of Fe-ur-wári, and between them there is a good broad opening, through which the course is North and South. Má-tura consists of a number of little islets on one coral reef, whose eastern end, dry at low water, projects more than 1½ miles beyond the islands : round this there is a good passage about half-a-mile broad, leading into the Atoll about N.N.W. and having not less than 9 fathoms in its shoalest part. The north-east side of this passage is the reef which extends 2½ miles from the south-west side of Wah-du.

Gateways along the Equatorial Channel.—Along the south face of this Atoll, which for a length of 25 miles fronts towards the island Phúa Molóku, there are nine passages or gateways leading into the interior ; eight are safe for ships, and, in case of being drifted near them, may be used to enter the Atoll at night, where anchorage may be had. Should the vessel not be able to pass out by the same openings, she may in the daytime steer boldly to the northward through the interior, in from 35 to 45 fathoms water, passing occasionally some small coral islands and reefs which are easily seen from aloft, and going out by one of the opposite gateways, as most in her route. Some of the islanders will gladly conduct them through for a few pounds of rice or bread.

Wah-du, about 1½ miles long east and west, and only half as broad, was, according to native account, once a very fertile and productive island with 1,200 inhabitants ; but for many years past, from some unassigned cause, has been nearly deserted, and now contains not more than 100 inhabitants, very poor. The island is worth visiting ; the ancient mosques, burial places, and other parts are very interesting. Close round its east

and north sides there is a broad channel into the Atoll on a West course. This passage is more than one mile broad, but shoal water with patches of 3 and 4 fathoms (in most parts 7 and 8) spoil its northern part, so a vessel must borrow upon the Wah-du side, where depths of 25 and 40 fathoms are found; the shoal water is, however, convenient for ships to anchor upon in obtaining wood and water from that island. The tides are strong in this opening.

Between Wah-du and Ghang gateways there are three others amongst islands; the first or western one leads up North, and is very deep; the other two have a N.W. course through, with depths of 5 and 6 fathoms.

Ghang island, lying half-way from Wah-du towards the south east point of the Atoll, is the largest of the group, and shows plenty of trees on more than 1½ miles of frontage to the ocean. On both sides of the island there are good channels. That to the west, being broadest and deepest, is called Ghang channel; it is 1½ miles broad, with soundings of 30 fathoms throughout; as you enter on a North course an island is seen in the centre, which may be passed on either hand, but on its seaward side a projecting reef of considerable extent points south to the entrance of the channel. As the Atoll is entered, several islets and reefs will have to be passed, but all are plainly visible from aloft.

Guddu, the principal island of the mat manufacture, lies about a mile from the north-east point of Ghang, the intervening space affording a shoal and narrow passage into the Atoll. This island is the southern of several on one reef, looking at a distance like one island; the reef is nearly 6 miles long, and its north-east island has plenty of cocoa-nut trees which mark the west side of the Kan-du hu-lu-du opening.

Kan-du hu-lu-du is the south-east island of the Suadiva group, and has a fine wide opening on its west, with 7 and 8 fathoms water, leading north into the interior of the Atoll; this passage is the last of those that border on the Equatorial channel. From this island the barrier reef runs up northerly, with several islands on it, for 6 or 7 miles before another gateway is found.

Eastern Gateways.—There are also nine entrances for ships along the east face of the Atoll, between its south-east and north-east points. The first of these is 28 miles above the equator, past the north side of Mah-ra-rah (the northernmost island on the last-mentioned barrier reef), on a West course towards a small island 2 miles within the Atoll. Of course a sailing vessel could only enter this and the other eastern channels with a leading wind.

De-ah-du and Kunday are two inhabited islands where good water is obtainable; between them there is a narrow but deep entrance with 17 fathoms water; a West course leads in, and then a vessel may anchor

on the west side of Kunday, if in want of water. Another entrance, with 10 fathoms, exists by the north point of Kunday reef, 3½ miles above the last-mentioned gateway, and another with 8 fathoms, 2 miles farther northward.

Nil-an-du.—A deep bight is formed in the 11 miles of boundary between Mah-a-du and the north-easternmost barrier reef of the Atoll. In this space there are five gateways; the middle ones being conveniently situated at the bottom of the bight, round both sides of Nil-an-du island, which is situated 39 miles northward of the equator, is inhabited, has good water and some supplies, with good anchorage in the N.E. monsoon. Nil-an-du northern passage leads into the Atoll on a West course; the southern passage has a W.S.W. course. Northward of this island lies a reef which is 4 miles in length North and South, and has six islands on it; the northern one Mah-men-du is inhabited, and has a passage with 13 fathoms water between it and Ku-ber-du.

Willee-gillee is only half-a-mile to northward of Ku-ber-du, and between them there is a very contracted passage, about 2 cables wide but with 12 fathoms water, the last of the five gateways in the north-east bight. This island has a few inhabitants, and stands on the south extreme of the 11 miles of impassable barrier reef which forms the north-east boundary of this Atoll; near it are four small islets, then nothing but reef for 5 miles till you come to Ma-mutah, two small islands, which are generally first seen by ships coming from the north-east.

North and North-west Openings.—On its north and north-west sides the Atoll is bounded by many detached coral reefs more irregular in position and outline than those as yet described; numerous safe passages exist between them, but in adopting these a careful mast-head look-out must be kept, as there are no islands on the northern verge of the reefs, though two or three lie about a couple of miles within the boundary; these, the northernmost islands, are five miles and upwards from Ma-mutah.

Mah-foo-ree, the principal island at the north-west projecting angle of the Atoll (14 or 15 miles to the west of Ma-mutah, this being the breadth of the Atoll's northern portion), is well inhabited, has good fresh water and plenty of poultry, &c. It stands one mile within the north point of its fringing reef, which extends also 4 or 5 miles to south-east. Mah-foo-ree entrance is wide, but Willee-gelly islet lies in the very centre, thus separating the western passage, which is shoal with only 4 fathoms water, from the eastern one, which has a depth of 34 fathoms. Some islets and reefs to south and east of Willee-gelly must be avoided by a good look-out from the mast-head.

The surveyors were detained under the lee of this island for 15 days in December 1836; the wind was blowing in hard squalls and fresh gales

from West to W.N.W. with heavy showers of rain. Anchorage is to be had in 10 fathoms water, with the island bearing West, distant one mile. A ship wishing to stop here for supplies, if from the northward, ought to enter the Atoll by one of its northern entrances, and then steer to S.W. and to West, passing between some small islands towards Mah-foo-ree, which is the most western and largest.

Deep Bight.—Between Mah-foo-ree, the north-west island, and Tin-a-du (which with Kan-da-du and Hun-da-du form the westernmost projection of the Atoll's boundary), there are also nine passages into the internal water along nearly 30 miles of detached reefs, which form a deep bight, dangerous for a ship to drift into in calms and light winds. Here the ship *Surat* was wrecked in 1802, on the very side of a fine opening, which lies 7 miles to S.E. by S. of Mah-foo-ree, and is the second entrance below that island. The bottom of the deep bight bears S.S.E. 8 miles from Mah-foo-ree, and N.E. 19 miles from Tin-a-du. Along this boundary there are no tree-islands, but merely heaps of coral stones and sand, on only two of which are there any bushes, and this absence of conspicuous landmarks renders the bight dangerous; but a ship in extremity might be run through one of the nine passages with the help of the large scale charts of the Maldivhs and a good look-out at the mast-head. The best of the gateways are on the Tin-a-du side of the bight, and the nearest one to that island bears from it N.E. 4 miles.

Tin-a-du, the westernmost inhabited island of Suadiva Atoll, bears S.W. by S. a little southerly from Mah-foo-ree, distant 22 miles, and lies about four miles to the northward of Hun-da-du, where the chief of the Atoll resides (see page 254). This island is about one mile in extent, containing about 200 inhabitants, has good water and a few supplies. It lies 31½ miles north of the Equator. A ship approaching it from the West or South-west would suppose Tin-a-du to be the most northern island of the Atoll, owing to the absence of any tree-islands along the boundary which recedes to the north-east from this point.

Should a ship wish to enter the Atoll, or if there is much chance of her being drifted into the deep bight to the north-east, she ought, if possible, to enter by the small but safe channel on the south end of Tin-a-du, where there is a depth of 6 fathoms, although the passage is not quite one cable wide; but its south bank is well marked, being an islet with low bushes and one single cocoa-nut tree (1836). And again to the south of this islet there is another small entrance with a like depth of water, but the broader one, called Kan-da-du opening, to the southward of Kan-da-du island, and 3 miles south of Tin-a-du, is the safest to adopt, and leads also to Hun-da-du.

Kan-da-du Opening is the most convenient for ships, and may be said

to be the principal entrance into this Atoll, as it leads to the anchorage off Hun-da-du, the first described and principal island of the Atoll. It is a fine broad passage, one mile in breadth, having not less than 6 and 7 fathoms water. The centre of this opening is one mile north of Hun-da-du, but another island called Mad-a-velly (uninhabited) intervenes and borders the south side of the entrance. The anchorage within the Atoll, on the east side of Hun-da-du, has been described at page 254.

TIDES.—Near Mah-foo-ree, high water occurs about 1 h. on full and change, when the rise and fall is 4 feet.

The ONE-AND-A-HALF DEGREE CHANNEL, comprehending the space between Suadiva and Adu-Máti Atolls, is 51 miles broad, and free from dangers. It is adopted by vessels from the Cape, bound to Ceylon in the months of October and November. A ship soon passes through, but should she be drifted near either Atoll and be unable to pass clear, she will find four or five openings into the north part of Suadiva, and one large entrance near the south extreme of Adu-Máti.

ADU-MÁTI ATOLL.—This small Atoll, in shape like a leg of mutton, lies lengthways north-east and south-west for 26 miles, the former end being the smaller part; the greatest breadth is 15 miles. Its boundary reef, which is of more regular outline than any other Atoll, has six gateways, four of which are available for large ships. That on the south side has been mentioned as open to the One-and-a-half Degree channel. The west, north, and east sides have each one deep though narrow opening. The interior of the Atoll has numerous coral patches, all of which are discernable from the mast-head, as a vessel approaches them in succession on a clear day.

West Gateway.—Mhowah, at the west extreme of the Atoll, in latitude 1° 53′ 30″ N., is its principal island, where wood, water, and poultry are to be procured. It contains between 300 and 400 inhabitants, and trade is kept up with Calcutta every year by three or four vessels of their own construction, of from 80 to 100 tons burden. The west or Mhowah gateway, situated 1½ miles to northward of the island, is described by the surveyors as a narrow but safe channel, although no soundings are shown on the chart. The course inwards is S.E., afterwards turning to South and East, and then to South again and finally to West, to avoid a horse-shoe reef which interposes between the entrance and the east side of the island, where there is good anchorage in westerly winds, in from 17 to 20 fathoms water. There are two islands on the north side of this entrance, which are used as places of interment to those natives who die on board their boats.

South Gateway.—From Mhowah a continuous barrier reef, with several

islands, extends 11 miles to the south-east, forming the whole south-west side of the Atoll. Near the east extreme of this reef stand the islands Ku-nan-du and He-nadu-Adu, looking like one island 3 miles long; off the last the reef extends nearly three-fourths of a mile eastward, marking the west side of the South Gateway, which is a large and safe opening for ships, being two miles wide and with much deeper soundings than the hand-lead can show. Gah-du island, which marks the east side of this opening, lies to E.N.E. of He-nadu-Adu, a space of $2\frac{3}{4}$ miles separating them. Three islands lie just within this entrance on the west side of the centre, thus allowing of two fair passages into the internal waters; one leads up on a North course to eastward of these islands; the other turns West between the north face of He-nadu-Adu and the three islands, after passing which several coral patches lie athwart the way, these are discernible from aloft on a clear day. Should a ship enter this gateway, being in want of wood, water, and poultry, she ought to proceed through the Atoll to Mhowah island where supplies are obtainable, taking care to avoid the above reefs.

East Gateways.—From Gah-du the sea-face of the boundary reef goes in a convex curve to east, north-east, and north for 15 miles before another opening is found, all this distance is thickly covered with islands. The openings are met with on either side of Mah-ba-du island; the southern one is best, having 8 fathoms water, the northern one has only 3 to 4 fathoms; each has a width of 2 or 3 cables; a West course leads into both of them. Mah-ba du and the two islands, which form the north and south sides of these gateways, are inhabited.

North-east Point of Atoll.—At this, the narrow end of the Atoll, stands the large island Esdu, whose fringing reef projects only half a mile to the eastward, bearing N.E. by N. 6 miles from Mah-ba-du; about a dozen minute islets intervene between the latter and Esdu. This island is 2 miles in length and well covered with cocoa-nut trees, so as to be a good landmark. From the north-east tip of the Atoll a very straight boundary reef, without a single island, extends for 15 miles in a direction S.W. by W. $\frac{1}{2}$ W. till you come to the first of the north-west openings into the Atoll.

North-west Gateways.—Along the straight north-west face of this Atoll 2 gateways are found. The first, called Wad-i-nu entrance, along the east side of the little island of that name, is 13 miles from the west end of Esdu, on the bearing given above. The other is N.E. $\frac{1}{2}$ N. 8 miles from Mhowah island. A reef 2 miles long separates these two north-west gateways Wad-i-nu entrance, though the narrowest, being not 2 cables wide, is deepest and best. The other, along the east side of Moonia-foori islands, has not more than 4 fathoms water in it, and generally from 3 to $3\frac{1}{2}$ fathoms. From the last-named islands the boundary reef trends south-

west for 5 miles to a projecting elbow, thence South 3 miles to the Mhowah entrance already described.

VAI-MAN-DU CHANNEL, available for ships by night, as mentioned at page 250, has a width of 16 or 17 miles throughout its length, which is about 25 miles on a very straight course N.E. by E. ½ E. which is the line of bearing of the sea faces of both Adu-Máti and Collomandu Atolls, between which this channel lies. Although this channel is safe, navigators would have less anxiety in passing through the One-and-a-half Degree channel.

Tides.—It is high water in this channel, full and change, at 3h.; the rise and fall is about 4 feet. Flood tide runs to the east, and ebb to the west, with a velocity of about 2 miles per hour at the springs; each tide is accelerated or retarded by the prevailing current.

COLLOMANDU ATOLL is of somewhat circular form, its greatest diametrical measurement from east to west being 29 miles, and from north-west to south-east 23 miles; the latter face, as it forms the side of Vai-man-du channel, being flattened in. This Atoll is principally surrounded by barrier reefs, and in the whole circumference there are a dozen openings. There are many islands along the southern boundary but few along its north margin; and in the interior only 6 are found, these are near the west side. Numerous coral patches, dry at low water, lie within the Atoll, but the general depths are from 32 to 42 fathoms.

Of the twelve entrances into this Atoll, one is on the west side; four along the Vai-man-du channel, and the rest along the north face of the Atoll.

West Gateway.—This broad entrance lies between the two principal inhabited islands of the group, He-lan-du and Karn-du-du, which are 2½ miles apart. The passage in, which is two miles wide between the barrier reefs, has some shoal water in the middle, with coral rocks visible below water, on which are generally found 6 or 7 fathoms, yet in one spot there are depths of only 2 and 4 fathoms; this may be avoided by borrowing towards either island, where the water will be found very deep. Another island lies about one mile within the centre of this opening; and another northward of that and rather more than a mile to east of Karn-du-du.

Supplies.—He-lan-du and Karn-du-du both afford good water, firewood, and poultry; and a vessel may choose anchorage on the east side of either, according as the wind permits.

The South-west Barrier of the Atoll is a convex piece of reef 13 miles long, extending first southward, then eastward from He-lan-du to Vai-man-du, which is an inhabited island with good water, standing at the

west side of the next opening, the first of the southern gateways. There are several islands on the southern part of this boundary reef; the south-westernmost, called Fooree, are situated 5 miles to S.S.E. of He-lan-du; another called Kim-be-du, the most southerly of all, is situated 1½ miles to W.S.W. of Vai-man-du.

South and east Gateways.—There are three of these convenient openings in close proximity at the south end of the Atoll, and one towards the east end, all facing the Vai-man-du channel; but a long straight strip of barrier reef, 13 miles in length, separates the east gateway from the others. The 3 South gateways are formed by 2 islands which intervene between the south-west and south-east barriers. The opening between Vai-man-du and the first island, called Kan-he-me-du, is broad and deep on a N.W. course, but a large coral reef inside, rather more than a mile within the opening, compels a vessel to bear away to north or west as the wind permits. The second opening is narrower but good, having 6 fathoms water, but a vessel must borrow towards the island Kan-he-me-du, which marks the west side of the entrance, to avoid some rocks which project from the little island on the east or right-hand side of the entrance. The third opening is deep and safe, having 35 and 38 fathoms water between the last little island and Te-mar-rah, which stands at the south-west extreme of the long piece of barrier reef that borders the Vai-man-du channel.

The east gateway is situated 13 miles farther to N.E. by E., and the intervening barrier reef is thickly covered with islands. The opening is between Gu-rah-du (the northernmost of these islands) and Deah-me-gelli, and has about 8 fathoms water.* From this entrance the north-east extreme of Adu-Máti Atoll bears S.E. ½ E. distant 21 miles.

The Eastern Boundary of this Atoll is, like that on the south-west, a curved piece of barrier reef, about 15 miles long, without any openings. The large island Phalah, nearly 4 miles in length in a north and south direction, stands on the verge of this reef, and well defines the east extreme of the Atoll, for there are no soundings obtainable half a mile from the island, which is well covered with cocoa-nut trees.

North Gateways.—Along the north face of this Atoll there are several of these openings; those close to the east points of six straggling islands are said to be safe, though small, but the chart only shows soundings in three of them. The first of these openings has 5 and 7 fathoms, and is situated 3 miles to the west of the island Willi-foori, which is the north-easternmost one of the group. The island Bdoro-ni marks the extreme north point of the Atoll, and is just half-way between the north-east and

* The Chart shows not less than 19 fathoms.

north-west points. Bdoro-ni gateway is close round the east side of that island, and has 7 and 10 fathoms water. Half-way from Bdoro-ni to the west point of the Atoll there are two other openings, one on either side of Kandu-foori island; the first is close to the east side of that island, the other is 1½ miles more to the west; both have plenty of water. Southward of these, along the west side of the Atoll, there are no more openings till we come to that described at page 260 (the only west gateway), neither has this intermediate boundary reef any islands as landmarks throughout a length of 10 miles till Wali-gandu, which stands within 4 miles of that west gateway, near which island the *Adonis* schooner was wrecked in July 1835.

KOODAH-HUÁ-DU CHANNEL, so called after the island of that name at its western entrance, the southernmost island of Nillan-du Atoll, is a narrow but safe channel. The west entrance of this channel is only 10 miles wide, well marked on the north by the island Koodah-huá-du, but not so well on the south, where it is bounded by that north-west extreme of Collo-mandu Atoll which, at its most projecting part, has no islands or landmarks until you come to Kandu-foori islands, which are nearly 5 miles within the channel's entrance, and bear from Koodah-huá-du island S.E. by S. 10 miles.

The course through Koodah-huá-du channel is E. by N. The Atoll on its south side is soon past, as it shows a prominent point (the island Bdoro-ni) towards the channel, but the two Atolls on its north side give this channel a length of over 30 miles, such being the distance between the southern islands of Nillan-du and Molúk Atolls. The tides in this channel have the same direction as in those already described, viz., flood to East, and ebb to West.

Northward of this channel the Atolls lie in double rows—east and west Atolls—and, as the currents of the ocean are thereby more obstructed, they run through these narrow channels with greater velocity and uncertainty. The open space, nearly 20 miles in width, between the east and west groups, is, however, free from all dangers.

NILLAN-DU ATOLL (the most southern of those that lie in double rows) is 40 miles in length north and south, and is in reality two Atolls, being divided into two parts by a deep channel 3½ miles wide, in which no soundings could be obtained; therefore, for the sake of clearness, the southern and northern groups will be separately described.

South Nillan-du is of somewhat oval form, with the east and west sides rather flattened; in meridional length it is 21 miles, and from east to west 13 miles. Many passages admit of vessels entering the Atoll, but on the south-west side it is least accessible. The general depths in the interior

are from 27 to 35 fathoms. It is studded with many large and small coral reefs, some dry at low water, others having several feet of water over them, but all are deep-to and easily discovered. On the eastern boundary islands are plentiful, and in one place thickly grouped together, but the west side of the Atoll has only two or three. In the interior there are about 20 islands, more than half of which are towards the north part, and upwards of 3 miles within the boundary. At Doo-rais island, which is about 5 miles to north-east of the West gateways, there reside a number of working jewellers, who travel periodically among the different Atolls in pursuit of their calling.

Along the south side of South Nillan-du Atoll, and fronting Collomandu Atoll, there are three good openings; the first is 1½ miles wide, with 9 and 10 fathoms water, close to the east of the island Koodah-huá-du, which is inhabited, and affords some supplies of wood, water, and poultry; two small islands, at the west end of a separate reef, mark the east side of this opening. The second, one mile wide, with depths of 14 fathoms, is half-way from the above towards the south-east point of the Atoll. The third is at the south-east angle between the islands Warney and Kan-dim-bah; it is narrow but deep, having 20 fathoms, and a W.N.W. course leads in.

Kan-dim-bah, at the south-east extreme of the group, is the southernmost of 20 islands on one reef; from it the east side of the Atoll goes up in a due North direction for 17 miles, and in this length of boundary there are seven good openings; the first is 5 miles north of Kan-dim-bah, and the rest occur at intervals of about 2 miles, and on the south sides of the different islands.

Foori is the northern island on the Atoll's east side, and the last of the above openings leads in on a S.W. course close along the south-east side of Foori. From this island the boundary reef turns to the west for 5 miles, where is found the first of the north-west openings, a wide channel with 17 fathoms water between barrier reefs, but with no islands to point it out. The second and third of these openings are broader and deeper than the first, but, like it, have no islands or landmarks to distinguish them; they may therefore only be entered by vessels who unavoidably drift near them. The reefs which separate these north-west openings have no islands, and therefore the north-west extreme of the Atoll is unsafe to approach; the several islands, whose trees will be visible from a distance, are all more than 3 miles within the boundary reefs.

Two good entrances are found along the west side of the Atoll, a little to northward of its centre; but between these and the Koodah-huá-du channel there is not a single opening along 13 miles of boundary. These two West entrances are on the south sides of Mar-dáli and Hu-lu-dáli, both

inhabited islands, the latter the larger of the two. E.N.E. is the course into the northern opening, which, being between the two islands, is better defined than the other, and has 19 fathoms water. An E.S.E. course leads into the southern one, which has nothing but the sharp tip of a long barrier reef to mark its south side.

North Nillan-du.—The east half of this Atoll is a perfect semicircle, but its west side is rather dented in. There are not many islands on its boundary; only one on the west, one on the north, one at the south tip, and the rest rather equally distributed around the semicircle. In the interior, where the general soundings are 25 and 35 fathoms, there are four islands and several large coral reefs dry at low water.

Nillan-du, the southernmost island of the north group, is inhabited, and affords some supplies and good water; as it gives its name to the double Atoll, this island is or has been the most important one of the group. On its east side is situated the southernmost opening into the Atoll, one mile wide, and with 20 fathoms water; a course between N.N.W. and North will lead in. The barrier reef, at whose south point Nillan-du stands, stretches more than 4 miles to N.W. by N., allowing a good, broad, and deep passage into the Atoll along its north end. Then comes a circular lagoon reef, round the north of which there is another passage, narrow but deep; thence to Him-it-ti south opening there is a piece of barrier reef, having a sea face of more than 6 miles.

Him-it-ti, the western island, though small, is an important one in the Atoll; it has high trees, and contains between 200 and 300 inhabitants, who are great traders and navigators, sending annually to Bengal five or six vessels from 80 to 100 tons burthen. They have also a large school for instructing native youths in navigation, and they make some of their own nautical instruments. The fresh water of the island is, however, bad. It is said that the sea has for several years been gradually washing away this island.

There are openings into the Atoll on both sides of Him-it-ti. That on the south is more than half a mile from the island, has 6 fathoms water, and takes an E. by N. course inwards towards another island which faces the entrance and may be passed either to northward or southward. The opening on the north has 15 fathoms water, and takes an E.S.E. course along the face of the reef which projects 1½ miles north from Him-it-ti island.

A clump of cocoa-nut trees on a little island marks the north end of the Atoll; there is an opening with 15 to 20 fathoms water upwards of a mile off its west side, and another broad opening on its east side, with a little reef in the very middle. From this last opening, round the semicircular eastern boundary to the south point of the Atoll, other openings occur at every one, two, or three miles; some are very narrow, but all have suffi-

cient depth of water for ships; without counting the north and south openings into this Atoll, there are ten passages around the semicircular eastern half.

MOLÚK ATOLL is of irregular form along its east face, the north-east and south points being very prominent; whilst its west boundary is very straight and nearly on one meridian throughout its entire length, which is 25 miles. It is situated about 20 miles to the eastward of the Nillan-du group, and its south point bears N.N.E. 15 miles from the north-east point of Collomandu Atoll; these two points marking the eastern entrance of Koodah-huá-du channel.

The Atoll altogether contains 21 islands, 9 of which are inhabited, and have a population of 980; all are on the boundary reefs, except Molúk, the largest, which is nearly one mile within the principal entrance. In the interior of the Atoll there are no islands, but many coral patches, and the depth of water is from 28 to 38 fathoms on a sandy bottom, the greatest depth is 40 fathoms at the centre. The rise and fall of tide is about 4 feet, and high water occurs at 3h. at full and change.

Six islands in a cluster are situated at the Atoll's south end, two are inhabited and possess good water, but they can only be landed upon from the internal water; the nearest entrance is the southernmost of the 15 openings (all said to be safe though small), that are found along the straight west side of the Atoll; this entrance lies about 3 miles W.N.W. from De-lu-foori, the south island. From De-lu-foori the barrier reef goes in a north-east direction for a dozen miles, forming a bight to the south-east point of the Atoll; thence for 4 miles farther on a N.N.E. bearing to the Molúk opening. This south-east quarter of the boundary reef contains more than half the islands of the group, and they are clustered at its two extremes; several heaps of coral stones, on some of which bushes grow, are here and there seen above the surf, which, even in the N.E. monsoon, breaks very high here from a long S.E. swell.

Molúk Island and Entrance.—As you approach this place from the southward, the several small islands on the northern tip of the last-mentioned barrier reef serve to point out the locality. Molúk, a large island, at one mile's distance within the opening formed by the extremes of the south-east and east barrier reefs, may be known by a large banyan tree near its north and centre part; and, when approached from the south-eastward, this is seen just mid-way between the islands Molee and Vaivand which stand at the side of the gateway. Molúk town is on the north-east side of the island, contains 200 inhabitants, and affords good water, plenty of wood, and a few supplies such as the Maldivhs produce (*see* page 247); the most convenient place for taking in water is between the town and Vaivand island.

The Molúk entrance is two-thirds of a mile broad between the tips of the reefs that project from Vaivand and Molee towards each other, those islands being not quite two miles apart. Soundings of 7 to 18 fathoms are found in it, the deepest water being to the south, and the passage into the Atoll on the south of Molúk is also deeper and broader than that along its north-east side, having 18 fathoms water deepening to 24 and 28 as you pass that island, in which depths you may anchor on a sandy bottom; whereas the northern passage is contracted to a width of only 2 or 3 cables by shoal water projecting from both the east side of Molúk and the south side of Vaivand; however, with a fair wind, the centre of this passage is safe, having 8 fathoms water on a sandy bottom.

Molee and Vaivand islands have each a population of 200, but do not produce good water. The Atoll-wári, or chief of the Atoll, resides at the former.

North Openings.—From Vaivand the continuous boundary reef goes nearly straight about N.N.E. for 10 miles to the north-east angle o the Atoll, near which are two inhabited islands called Ry-mun-du, thence it elbows round to the west for more than 4 miles before another opening is found, then there are two passages by the east sides of Mad du-weri and Digghur-ru, little islands, both which are inhabited and have high cocoa-nut trees; these passages are very narrow, and more like dock-gates, being about a quarter of a cable wide, but have not less than 7 fathoms water. Intermediate between these islands and the north-west angle of the Atoll there are three other openings in the barrier reef, but almost too narrow for ships to enter, and having no islands to point them out.

West Openings.—From the north-west point of the Atoll, which is merely the elbow of a barrier reef with only a few dry rocks to distinguish it, the west side of the boundary reef goes very nearly straight in a South direction for 24 miles. In this space there are 15 openings, all safe for ships, though some are very small; indeed, almost at every mile an entrance is found, available for drifting into the Atoll, none of these passages have less water than 10 or 15 fathoms. There is only one island, Too-ah, along this west side of the Atoll, but it has neither inhabitants nor fresh water, and close to the south of it there is a good entrance with over 30 fathoms water, but there are coral reefs inside.

WAH-TER-OO CHANNEL and REEF.—This channel, which separates Molúk and Pha-li-du Atolls by a space of 8 miles, has in its centre a circular lagoon reef, with a diameter of 4 to 5 miles, dividing it into two passages which are 2 and 2½ miles in width, the southern being the larger; both are very deep, no soundings being obtainable with the ordinary deep-sea lead. Both these channels are rendered dangerous by the strength of tides and currents, and by the absence of landmarks on the

north sides of Molúk Atoll and Wah-ter-oo reef. The south end of the latter is, however, pretty well marked by two low bushy islets, between which there is the only opening, with only water enough for ships' boats, into the lagoon, in which there are soundings from 12 to 20 fathoms on a white sandy bottom. On these two uninhabited bushy islets there are some young cocoa-nut trees, and some wells in which the fresh water rises and falls with the tide, being drinkable only at low tides. Ra-khi-du, the southern island of Pha-li-du Atoll, marks well the north side of the northern channel. A vessel, drifted into Wah-ter-oo channel, may pass clear of all the Atolls either to north or south of Nillan-du, or between the two portions of that Atoll, according as the winds suit best.

PHA-LI-DU ATOLL has a more irregular outline than any yet described, being in shape like a gouty foot and leg, the sole of the foot being its south barrier and the toe its eastern point; the island Ra-khi-du forms the heel which marks the north side of Wah-ter-oo channel. There are no openings along the south and east sides, but at the south point of the Atoll there are two; along the south-west side there are nine; on the north-west side there are three; and between the north and east extremes, in the deep bight, there are 16 safe openings.

There are only 10 islands on this Atoll, five inhabited, with a population of 320. The chief of the Atoll resides at Tin-a-du, near the centre of the deep bight on the Atoll's north-east side. None of the islands afford wholesome drinking water, what they have is brackish, and the natives catch all the rain water they can by every available appliance; the cocoa-nut trees are very useful for this purpose, leaves being tied round the base of their trunks to act as pipes in conducting the water into jars. Of supplies, firewood is plentiful; a few fowls, some limes and fruit, and a few turtle may be procured.

South and West Openings.—The island Ra-khi-du stands between the two south openings, both which are fine safe passages with 20 to 30 fathoms water; they are 2 miles to N.N.E. of Wat-ter-oo reef. From them the general direction of the boundary is north-west for 15 miles to the Atoll's west point, and in this space there are nine openings, but the absence of landmarks suffices to deter vessels from approaching this west side. From the west point of the Atoll, where there is a narrow opening, the boundary goes in a north-east direction for 13 miles to Phu-li-du, an inhabited island at the north extreme of the group; along this north-west face there are three openings, all ill defined.

North-east Openings.—Of these there are 16 safe passages, though narrow. The first of these occurs at the distance of $1\frac{1}{2}$ miles to eastward of Phu-li-du; the second has no landmark to point it out, and a sunken

rock lies in mid-channel; the third lies one mile East of Dhig-gheri, which bears E.S.E. 5 miles from Phu-li-du; the next two are 3 miles farther south, on either sides of Alli Mattar island. Three islands lie at the bottom of this north-east bight; Tin-a-du, the northern one, is the residence of the Atoll-wári; but the openings, between these islands and some reefs which intervene, are so very narrow, and such a heavy swell sets directly upon them in the N.E. monsoon, and the tides and currents are so strong that it would be hazardous for a vessel to attempt these passages, more especially with very light winds. Between these islands and Fa-ta-o, which marks the east point or *toe* of the Atoll, there are other openings, but so narrow are they and not distinguished by any landmarks, that it may be said of this piece of barrier, as can be truly said of the whole south face of the Atoll, that it is one continuous barrier reef.

ARI-AD-DU and PHU-LI-DU CHANNELS.—The first lies to the westward of Pha-li-du Atoll, and between Nillan-du and Ari Atolls; it is 10 miles in breadth, free from danger and has no soundings. The other is between Pha-li-du and South Máli Atolls, and is 8½ miles wide. Vessels can conveniently pass through these channels, should they unavoidably drift near them. The tides set strongly through them during springs; periodically retarded or accelerated by the current. Flood sets eastward, ebb to westward; high water at 2½ h. full and change.

ARI ATOLL.—This west Atoll is situated to the north of Nillan-du and to the westward of Pha-li-du and Máli Atolls. In shape it is oblong, being 48 miles in length north and south by 17 in east and west breadth. It contains some half a hundred islands, the greater number being situated along its eastern boundary, and they are generally small. This Atoll, in common with those to the north of it (as mentioned at page 244) has no continuous barrier reef round it, except a small space at its south extreme. On the west, north, and east sides, there are numerous good passages leading into the Atoll, safe for any ship to enter; on the west there are 15, the half of which are very broad; one very broad one affords entrance at the north extreme of the group; more than 30 occur along the east side, some small, but all safe; whilst at the south end, only one break occurs in the barrier reef, and in this passage stands the island Ari-ad-du, allowing a safe entrance on either side of it.

In the interior, there are numerous large coral reefs, not all dry at low water, some having 2 and 3 fathoms water on them; many of those, whose edges are dry at low tide, have deep lagoons inside; all may be avoided on a clear day by a good look-out. The general soundings inside the Atoll are 30 to 40 fathoms; the influence of the spring tides is felt amongst the interior coral reefs.

South Entrance.—The island Ari-ad-du stands in the middle of this passage, which leads out of Ari-ad-du channel and is 10 miles to the northward of the north-west point of Nillan-du Atoll; depths of 26 and 28 fathoms are found on both sides of the island; the passages, though narrow, are safe, leading on a North course into the Atoll. Ari-ad-du and the island Mah-ma-gelly, to the west of it, are inhabited, and afford good fresh water.

The West Side of the Atoll is tolerably straight in a general northerly direction, but is formed of several large circular and oblong lagoon reefs; the 15 intervening water-spaces are mostly broad, and occupy as many miles of the Atoll's length as the reefs do. The first passage, about 9 miles W.N.W. from Ari-ad-du, is narrow, as are also the next two; but the fourth and fifth are more than 2 miles broad; the inhabited island Man-du standing between them on a reef nearly 4 miles long. All the rest of the passages are deep and safe, those on either side of Mah-lus and Feri-du being better defined than others by the high trees of those inhabited islands. The four islands Man-du, He-men-du, Mah-lus, and Feri-du are inhabited and afford wood, water, and some few supplies. The northernmost openings of this west side are situated at $1\frac{1}{2}$ miles above and below Máti-wári island, which is inhabited and also affords good water and some few supplies.

East Side.—The north extreme of Ari Atoll is an oblong lagoon reef extending 6 miles to N.N.E. of Máti-Wári, and affording a broad deep North entrance, with soundings of 25 to 29 fathoms, a convenient space for ships to anchor throughout a space of many miles, as all dangers are visible. Then comes another reef and another good passage, at the east of which stands the island Oku-lus, which is inhabited and affords some few supplies with firewood and water. A little islet lies one mile to north of Oku-lus, and another at the same distance on the east; and hence a chain of little reefs, extending for 6 miles to the south-east, make the margin of the Atoll till we come to the northernmost of the numerous islands which lie along this nearly straight east side. Many are the eastern passages leading into the Atoll, occurring at intervals of less than one mile; some are small, but all safe if a good look-out is kept. The south-east opening is the broadest, and being situated to the northward of the large island Dhighurah, is well marked out. This last island is at the north-east end of the barrier reef, which constitutes the south extreme of Ari Atoll.

ROSS ATOLL is a large lagoon-reef situated $4\frac{1}{2}$ miles off the north-east point of Ari Atoll, and connected to it by a plateau with soundings of 100 to 140 fathoms. This miniature Atoll is circular, its diameter being $4\frac{1}{2}$ miles; the north and west sides are one continuous barrier reef; the east side is also one reef, but entrances occur at the north-east and south

extremes of the Atoll. The South entrance, only fit for small vessels, lies between two islands, Coura-mat-ti and Rus-du. The North-east entrance has 8 fathoms, and is situated about one mile to northward of Weli-gan-du island. In the interior of the Atoll there are soundings from 15 to 20 fathoms, but detached coral patches abound.

TO-DU ISLAND, situated 5½ miles to northward of Ross Atoll, is a solitary island at the West entrance of Cardiva channel; it is steep and safe to approach, the reef which surrounds it being nowhere a cable's length from the trees, which cover the island and make it visible 20 miles from a vessel's mast-head. It contains between 200 and 300 inhabitants, has good water and some supplies; the islanders are principally employed in fishing. The islands, To-du and Cardiva, being such excellent land-marks, make the Cardiva channel a most useful cut through the Maldivh archipelago.

SOUTH MÁLI ATOLL is situated 23 miles eastward of the centre of Ari Atoll, the intermediate space of sea being perfectly free from dangers and much sheltered from the ocean swell. It is also separated on the south from Pha-li-du Atoll by the Phu-li-du channel, which is a little more than 7 miles broad, and from Máli Atoll on its north by War-du channel, not much more than 2 miles broad. In shape it is oblong, 20 miles in north and south length, by 12 in greatest breadth which is towards the north end. It contains 22 islands, three only inhabited, counting altogether 200 people. None of them afford good water or supplies, they are nearly all situated along the eastern boundary, only three or four being on the west side, but there are safe passages on one or both sides of all except the four or five smaller islands at the south-east extreme of the group which stand on a piece of barrier reef 8 miles in length. The general depths in the interior are from 25 to 32 fathoms, sandy bottom, but it is full of reefs and little coral patches, which are, however, easily avoided by a good look-out from the mast-head.

South, West, and North Sides.—One good opening, half a mile broad, with soundings from 5 to 8 fathoms, is found at the south end, between the west tip of the south-east barrier-reef, and an islet composed of a heap of dry coral rocks. From this the Atoll's west side goes up North nearly straight for 15 miles, having several safe openings, the broadest and best being in latitude 4° 1′ N. Hence the boundary curves round to north-east, affording two or three more but small passages through it. At the north end of the Atoll, on either side of War-du island, there are good openings leading out of this Atoll into War-du channel.

East Side.—Eastward of War-du openings, a barrier reef extends nearly 5 miles, having near its east extreme the small island Fino-rah, close to the south of which lies the first of the eastern passages into the Atoll, a

fine opening nearly a mile broad, and having another island Him-bu-du about 1½ miles within the entrance and facing it as a vessel leads in on a west course. From this opening the east side of the Atoll goes very straight on a S.S.W. direction for 17 miles to its south-east extreme, having in this length of boundary 4 or 5 openings of which no description is given by the surveyors, but by the chart they appear to be as safe as those on the north-west side of this group.

War-du Channel, separating the North and South Máli Atolls, is at its narrowest part, less than 2½ miles wide, but its depth is great, no soundings being obtainable at 200 fathoms. The tides in it are very strong, flood sets to east, ebb to west. During the monsoons, that tide, which is accelerated by the prevailing current, runs with great velocity, 4 miles an hour, causing a great rippling and whirlpools in the sea, which in light winds it is difficult to steer a ship through.

MÁLI ATOLL or NORTH MÁLI ATOLL, the principal one of the whole Maldivh group, lies to the north of the last described. Both north and south groups are included by the natives under the name of Máli, but being separated by a channel without soundings, they are certainly two distinct Atolls, and need to be separately described. This North Atoll is of irregular shape, tapering at north, south, and east ends; the entire west side is a convex, the north-east and south-east faces concave. Its north and south length is 32 miles, its northern island, Kaghay, and the southern one, Máli, being in the same meridian. Its central width is 23 miles. It contains about 50 islands, 12 inhabited, and innumerable coral reefs. The general depths in the interior are from 25 to 35 fathoms, sandy bottom, but in passing through it, a sharp look-out is required even in the day time, so numerous are the coral patches; the eye, and not the chart, must guide a vessel through.

A navigator must keep in mind that all the openings into this and other Atolls, are not distinctly seen at a distance of 3 or 4 miles, the barrier presenting in appearance one continuous line of reef, alarming for strangers to approach. But no danger need be apprehended when the wind is steady, and by nearing them to the distance of one or two miles, the channels are distinctly seen, unless the sun glares in the face.

Máli or King's Island, the capital of the Maldivh group, is at the very south of this Atoll, bearing N.E. 4½ miles from War-du, the northern island of the South Máli group. It is oval-shaped, in length about one mile, by three-quarters in breadth. Its south side is inaccessible to boats, being one unbroken reef just awash; but the rest of its circumference has a lagoon within a wall of coral, roughly built up occasionally with a little labour; this gives excellent shelter to the boats of the natives, there being

from 6 to 12 feet water within it at the north side of the island, where its entrance or gateway is, which at night-time is closed by a boom being drawn across. Near this gateway stands the principal fort of the island, a solid mass, about 20 feet high, faced with stone; here the flagstaff is, and several good cannon. The fort wall extends also round the east and west sides of the island, but not on the south. The Sultan's palace is a large upper-roomed house with a peaked roof, covered with thick sheet copper; it is in a walled enclosure which is surrounded by a shallow moat, comprising an area of about a quarter of a square mile. There are several mosques in the town, and a tower 40 feet high from which the crier calls the faithful to prayer at certain hours.

People.—Máli contains between 1,500 and 2,000 inhabitants; many are traders, but the most common employments are fishing, gathering cocoa-nuts, drawing toddy, weaving cloth, and collecting the small cowries which pass as money. None of the islanders in other Atolls are allowed to trade with foreign vessels, except at Máli, where all trade must be carried on. The Sultan attires himself like an Indian Muselman, but no other person dares to wear more than a cloth around the loins, and a plain red handkerchief on the head; nor can any but the Sultan have an umbrella carried over him, for it is one of the insignia of sovereignty.

The Sultan and head men are much pleased if a ship on arrival salutes with a few guns, which compliment they return, and then the Amír-el-Bahr, or Master Attendant, comes on board to inquire after the health of the ship's company, that no contagion, particularly small-pox, may be brought to that place. The climate at Máli is, as regards the feelings, neither oppressive nor disagreeable, yet it is very unhealthy, particularly to strangers, either European or Asiatic, and the latter seem to feel its effects first. Nobody ought to sleep on shore, and if this rule be acted upon, a few days' or weeks' residence will not be attended with ill effects.

Good water may be obtained at Máli, but no supplies.

Anchorage.—There are no soundings to the south of Máli, but round the inner side of the island the depths are from 28 to 25 fathoms, sandy bottom, in which depth a vessel may anchor anywhere as most convenient. As good a berth as any is with the flagstaff bearing S.E. and about half-a-mile distant. During the S.W. monsoon from June to December, vessels moor on the east side of a lagoon reef which bears N.N.W. $1\frac{1}{2}$ miles from Máli; on the edge of this reef are several anchors, dry at low water, to which vessels make fast, with a stern anchor to the eastward.

Tides.—High water occurs at Máli at 12h. 30m.; rise and fall 3 feet sometimes 4. The flood-tide sets past the south side of the island to

eastward, the ebb to the westward; when accelerated by the current they are very strong.

There are good and safe passages to Máli anchorage on each side of the island available with southerly winds; but, with the northerly or N.E. monsoon, ships are recommended to adopt the next large opening, which is 6 or 7 miles N.N.E. of Máli, and then to pass down between the islands and reefs. This opening is nearly 1½ miles broad, with soundings from 28 to 25 fathoms sandy bottom; its north side is well defined by a remarkable clump of cocoa-nut trees standing at the south extreme of a long reef (but care must be taken not to mistake another similar clump 3 miles more north-eastward, *see* page 274). On the southern side of this entrance there are two small cocoa-nut islands and a sand-bank with bushes; a vessel may pass between all these, but the best passage is round their north sides, when, after rounding the sand-bank, she may steer S.S.W. and South towards Máli flagstaff.

West Side of Atoll.—Ships approaching Máli from the westward in the westerly monsoon, will have entered the Cardiva channel between Horsburgh Atoll and To-du island. Passing close on the north side of the latter, they should steer S.E. by E. for the War-du channel, War-du island being on that bearing and 35 miles from To-du island, which latter being visible 20 miles from the mast-head, as also is Máli, the one will not be lost sight of before the other is seen. Geráva or Divided island, lying 6 miles W. by N. of Máli, is half a mile within the line of boundary and has a passage on the south of it into the Atoll on a N.E. course; the reef on which it stands extends nearly 2 miles to the westward and forms the south-west point of the Atoll. Northward of Geráva there are nine openings between lagoon reefs along the west side of this group; the largest one is abreast the island Haim-bud-du, which is nearly 2 miles within the boundary, in latitude 4° 28½′ N. Of north-west openings there are three small but safe ones; two at the sides of a thick bushy islet Okani-foori, situated 9 miles to northward of Haim-bud-du; the third opening is one mile farther to the north-east.

North Part of Atoll and Gáfor Reef.—The north part of the Atoll is a lagoon reef two miles long, which has passages on either side into the internal waters; both have 23 and 24 fathoms water; one is to the eastward of a sand-bank, the other to the eastward of a pile of coral stones which lie 1½ miles to northward of Kaghay, the most northern island of the Atoll, with a clump of trees on it. Northward of this lies the island and lagoon reef of Gáfor, separated from the body of the Máli Atoll by a narrow deep channel, 1½ miles wide, with no soundings in it (thus being entitled to call itself a *separate* Atoll, as much as the similar lagoon reefs called Ross and Horsburgh Atolls). Gáfor island is situated exactly

2 miles north from the northern point of Máli Atoll, and stands at the east extreme of its own reef where there is no entrance into its lagoon; the only two openings it has are in the centre of the north-east and north-west faces, but they are very minute and have no marks to distinguish them.

East Side of Atoll.—From the north extreme the boundary of the east side takes a south-east direction for 20 miles, and thence a south-west direction for 20 miles to the island Máli which has been described as standing at the south-east point of the Atoll. Several large lagoon reefs with passages between them, are found along this north-east side of the Atoll; the first are on both sides of Hellen-geli, a long low island with a peculiar single cocoa-nut tree (1835), at the distance of 5 miles to the south-east of Kaghay; the rest of the openings have no marks to guide a ship, she may pass through by keeping a good look-out.

The easternmost islands of the Atoll, Mefaing-foori and Devam-poori, are situated 14 miles to south east of Hellen-gèli. As a vessel approaches them from the eastward within 16 miles, they sometimes look like one island; at the same time, a high clump of trees will be seen beyond them, this is the little island As-du, whose cocoa-nut trees are very high, but lying some 2 or 3 miles within the boundary. Two good entrances occur with As-du bearing W.S.W. and S.W.; on which courses a vessel can enter the Atoll with a northerly wind and thread her way down to Máli by a good mast-head look-out. Devam-poori has 150 inhabitants, and good water; they can supply pilots for Máli, but it is doubtful if they will come out, the islanders being so timid and reserved.

From the east point of the Atoll, the long lagoon reef on which Devam-poori stands, extends in a south-west direction for 6 miles, where three small cocoa islets are formed at its tip, affording a passage between them and Toolis-du, but not recommended. Another passage occurs after other 5 miles to the south-west, round the south sides of three more smaller islets, on one of which there is a remarkable clump of trees. But the best and largest opening (recommended to ships at page 273) lies 3 miles farther to south-west, or 15 miles from the east extreme of the group; this passage should be adopted by vessels bound to Máli in the N.E. monsoon.

CARDIVA ISLAND and CHANNEL.—This channel, taking its name from the island that stands at the middle of its eastern entrance, comprises the space of ocean between Máli and Ari Atolls on the south-east, and Phaidi-Pholo, Mahlos Mahdu, and Horsburgh Atolls on the north-west. Its narrowest central part has a width of 24 miles, and its extreme length is between 70 and 80 miles in a N.E. and S.W. direction. Hoo-waili-foori island, with a high clump of trees, on the south end of Phaidi-Pholo Atoll, clearly marks the north side of the eastern entrance into Cardiva channel;

but its south side is not so well defined by Gáfor reef, which has no landmarks along its north and west sides. The landfall at the western entrance of Cardiva channel is not so good, as the tree islands of Ari and Horsburgh Atolls stand some 4 or 5 miles within the prominent points of their boundary reefs; but To-du island, at 10 miles within the channel, does for the west what Cardiva does for the east entrance.

Cardiva island is covered with a dense mass of high cocoa-nut trees, contains about 200 inhabitants, and affords good fresh water and some few supplies. Its south-east side is convex and deep-to, having no soundings in 240 fathoms water close to the beach. On its north-west side there is a circular reef, having a lagoon inside, where the natives snugly anchor their boats off the village on the north side of the island. The entrance into the lagoon is near the north-east point of the island, marked by a few sticks placed as a beacon; a ship's boat can only land on Cardiva by passing this one boat passage through the fringing reef. There is generally a heavy surf round this island and reef, except at the boat opening.

Cardiva channel is extremely useful for ships to and from India. None ought to attempt to work through against the strength of either S.W. or N.E. monsoons; with wind and current against them, it would be next to impossible. But it may be advantageously adopted when the monsoon is fair, or at the change of monsoons, when the winds are light and variable, as for instance, in November, when an outward-bound ship has crossed the line to westward of the Maldivhs, and finds the wind hanging too much from eastward of the North point to allow of her taking the 8° or 9° channel without much loss of time, she may then use the Cardiva channel, and make Ceylon or the coast of India by Cape Comorin. At the change of monsoons calms are very frequent, yet little or no danger is to be apprehended, this channel being very capacious.

TIDES.—The flood tide in Cardiva channel sets E.N.E. and ebb W.S.W; high water at 12 h. at full and change. During the N.E. monsoon, little or no flood stream is felt, but the strength of the ebb is considerably increased by the strong current running with the wind. Contrariwise in the S.W. monsoon the flood is strong, with little or no sensible ebb stream.

HORSBURGH ATOLL, a lagoon reef, (the tree-islands of which are about equidistant 25 miles from Cardiva and from To-du, bearing North from the last and W. by S. from the first,) marks the north side of the west entrance of Cardiva channel, and is separated from Mahlos Mahdu Atoll by a deep space about 6 miles wide. This Atoll is small, of an oval shape, its greatest east and west length being 10 miles, which is more than double its breadth. It has three large islands on the north and east parts, all inhabited with an aggregate population of 200; they afford wood, water, and some supplies. Goidu is the eastern and largest. The only entrance

into the lagoon, the Dorah-kandu, is on the south side of the Aatoll; to make this from a distance, a N.E. course should be shaped for Fhen-du (seen from aloft), the central of the three large islands, until on that bearing the several stony islets are sighted which bound both sides of the entrance; then the mast-head look-out will detect the passage between them, which is apparently one mile broad, but deep water is confined to the west side, thus narrowing the ship-passage to one or two cables only. There is fine anchorage in the interior, in 17 to 20 fathoms, sandy bottom, mixed with mud and clay, and free from rocks in the centre though they are found near the barrier reef.

MAHLOS MAHDU ATOLL.—This western Atoll, upwards of 50 miles in meridional length, is distinctly cut into two parts by a narrow deep passage, called by the surveyors Moresby channel; thus two groups are formed, which have been called North and South Mahlos Mahdu. The south end of the South group bordering on Cardiva channel, is available for ships to anchor who wish to obtain a few supplies and wood and water, which are to be had at He-tah-du island, only 7 miles to the north of Horsburgh Atoll. But it would be impossible for ships to navigate with safety through the centre part of the North group, it is so full of small coral patches and rocks, called by the natives the *jungle*. However, the Moresby channel may be adopted by any vessel who through error in reckoning gets entangled in these groups.

South Mahlos Mahdu is of irregular outline; its south-east side is tolerably straight and faces the Cardiva channel; its east point is prominent and in the same latitude as the south point of Phaidi-pholo Atoll, which is nearly 20 miles distant. From the east to the south-west point of this group the length is 26 miles, and most of the islands border this south-east face. At the extreme south, opening into Horsburgh channel, is a good entrance into the Atoll, by which a vessel from the westward may obtain access to anchorage on the north of He-tah-du, at which island, containing 250 inhabitants, wood and water are procurable. There are passages on both sides of He-tah-du and its adjoining islands, as well as between all the islands and reefs along the south-east and north-east boundaries. The Atoll-wári, or chief man of the south group, resides at Dhur-an-du, an island containing 100 inhabitants and good water on the boundary, situated 6 or 7 miles to southward of the east point.

The west side of this group is composed of large separate lagoon reefs with scarcely any islands to distinguish them, but passages into the Atoll are found between them all. The west entrance of Moresby channel is difficult to make out, being less than 3 miles wide, having no tree-islands but only barrier reefs. Another deep but very narrow gut leads on about an East course through the Atoll to southward of Moresby channel, having

a common entrance with it on the west. But vessels had better avoid making either of these from the westward.

North Mahlos Mahdu is of very different shape from the south group, being 35 miles in north and south length and only 15 miles in its broadest part; but its character is similar, having its west side composed of a series of round or oval lagoon reefs irregularly placed, some prominent, others retiring, (a peculiar feature of all these northern Atolls,) whilst the east side is a gentle curve with a series of islands, 20 in number, between all which there are good passages leading into the Atoll. None of these islands have good water, except Fainu, the second northward from Moresby channel, where the collector of revenue, the chief of Atoll, resides. The lagoon reefs along the west boundary have little to point them out and had better be avoided, especially as no vessel could navigate through the intricacy of the Atoll's centre; but its northern end is narrow and clear of reefs, and may be navigated through with ease; the general depths are from 23 to 27 fathoms water.

The north part of this group has a broad passage between two reefs, with plenty of ground on which vessels might anchor, then a bottomless channel between these reefs and Powells islands, two inhabited islands standing on a detached reef of their own, with no soundings off it, which may be said to mark the north extremity of the whole Mahlos Mahdu group.

PHAIDI PHOLO ATOLL lies to northward of Cardiva island and eastward of Mahlos Mahdu. It is of a square shape with its north-east and south-west sides pressed in and the others rather convex; thus it presents four prominent corners, at the southern one of which stands Aligow island, being 16 miles N. by E. of Cardiva; and at the west corner is Kani-foori island, bearing N.E. 10 miles from the eastern point of South Mahlos Mahdu. Aligow island has high trees, and thus well marks the west extreme of the long barrier reef that forms without any opening the entire south-east face of the Atoll. A broad opening is found to the north of Aligow, and along this concave south-west side there are several other good passages between islands.

The north-west islands can furnish good water and some supplies. The Atoll-wári resides at Nah-fori, one of the most thickly inhabited islands, situated at one-third of the way from the west to the north point of the Atoll. Passages into the interior occur between all these north-west islands; that between the two northernmost islands is more than half a mile broad, with 17 and 20 fathoms water, but some reefs will be found inside. Along the north-east concave face only two or three openings are found, and these are in the northern half; thence nothing but unbroken barrier reef extends to the east extreme and round to Aligow, the south point of the group. In the N.E. monsoon the sea breaks with considerable violence along this

extensive barrier reef, which is 18 miles in length and has several islands; at low water large masses of coral rock and some sand-banks are observed along its sea-face.

Within this Atoll many coral patches, dry at low tide, and several sunken reefs are found, with one or two fathoms water on them; the general depths on a sandy bottom are from 25 to 30 fathoms. There are upwards of 20 islands, but only four inhabited in this Atoll, and they contain 550 people; several of the others have been inhabited, but, according to native information, the population had died off or had deserted the islands. The tides and currents run strong through the openings into the Atoll.

MILLA-DU MADU ATOLL lies to north-east of Mahlos Mahdu, being separated from it by a channel only 7 miles broad, and its southern islands bear N.W., 10 miles distant from the northern islands of Phaidi-Pholo. This Atoll contains 101 islands, which are extended over a space 55 miles in length in a north-westerly and south-easterly direction, by not quite 20 in breadth; 29 of them are inhabited, containing a population of 1,700 or 1,800. The islands are principally located along the east frontier and in the south-east part of the Atoll. The officers who surveyed these islands report that cotton is grown in small quantity on some of the islands of this group, and it is reasonable to suppose that others of the Maldivhs might produce the same with a little trouble.

Ships can easily pass through this group in the day time as the interior has few reefs, especially in the northern portion; the general depths are from 20 to 25 fathoms, sandy bottom, with clay at times. The tides are felt in the Atoll, running about 1½ to 2 miles an hour at the springs; the flood to E.N.E. the ebb to W.S.W.; the currents influence the tides much. The islands and lagoon reefs which form the boundary of this Atoll are more separated than in the groups previously described, thus leaving broader passages into the interior. There are not many islands along the west frontier but more lagoon reefs, not in one connected barrier but in detached portions; on some are small islands, and between the whole there are safe passages.

The principal islands are Man-ah-du and Kain-de-co-lu, both near the east boundary, the former about 8 miles from the Atoll's south end, the latter about 10 miles north of the former. Good anchorage can be had at Man-ah-du, either on its north or south sides, according to the season; it is a beautiful island, filled with groves of bread-fruit trees and other luxuriant foliage; it contains 100 inhabitants, whose village is on the north side of the island, but good landing places are found on both north and south, and a fine pathway through the island. The Atoll-wári resides at Man-ah-du. Good water and some supplies may be obtained; the natives keep their boats inside the reef on the north-east side of the island.

There is good anchorage also to the west of Kain-de-co-lu, near its south point, where good water may be obtained from the village; the passage into the Atoll round the south side of this island is broad and safe.

MALCOLM ATOLL, a large lagoon reef, 15 miles long and only 3 broad, lies about 10 miles to westward of the north-west part of the last-described group. It was unknown to Europeans previous to the survey of the Maldivhs in 1834–36; but, according to native information, many ships have been totally wrecked on its barren reef, and all lives lost, scarcely a vestige of the wreck being left after a few hours, from the violence of the surf and the perpendicular sides of the reef. The lagoon is deep but full of coral patches, and has two passages into it along the east barrier, but only fit for boats.

The north-east point of this little Atoll is well marked by Mah-kundu island, containing 100 inhabitants and good water. The north-west projection has also a small island, but the remainder of the west side and the south have nothing to point them out but the surf. The south end of this reef bears N.W. 24 miles from Powells islands.

TILLA-DU-MÁTI ATOLL is on the same plateau of soundings as Milla-du-Madu, and the frontier islands of both are visible one from the other; thus this Atoll is indeed a continuation of the other, and it is not known why the natives give them two names. From its junction with Milla-du-Madu this Atoll takes a N.N.E. direction for 30 miles. There are nearly 40 islands in this group, generally of a large size and some distance apart; those at the north and east extremes are largest and inhabited, affording good water and some supplies. Safe passages occur between them all. Keelah, the northern island, forms a very prominent point to the Atoll; it is low, like all the rest, but covered with cocoa-nut trees, which are visible 15 miles from the mast-head.

The west boundary has not so many islands but more reefs, between all which there are safe passages, should a vessel be drifted near them, but they had better be avoided. The tides are felt as at the last-described group.

Gulandu Channel, between Tilla-du Máti and Hea-wandu Pholo Atolls,* is at its west, the narrowest part, less than 3 miles broad, but its eastern mouth is wide. No bottom could be found with 220 fathoms of line; but should a vessel be drifted into it, she will find passages into the Atolls on either side, where she may anchor. The ebb tide runs W.S.W., and flood E.N.E.; high water at 9 h. 30 m., full and change; rise and fall 5 feet.

---

* *See* Chart:—Cochin to Cape Comorin, including the Maldivhs, No, 2,738; scale, $m = 0{\cdot}08$ of an inch.

HEA-WANDU PHOLO ATOLL is the most northern one of the Maldivh group, and lies off the north-west side of Tilla-du Máti, being separated from it by the Gulandu channel. In extent north-west and south-east it is 12 miles; crosswise it measures 7 miles. It has 24 islands, three or four of which are large; they lie on all sides of the boundary, but the principal ones are at the south-west and north-east sides; seven only are inhabited, containing a population of 760 souls; they afford wood, water, and some supplies. There are three small islands in the centre of this Atoll, abounding with fine green turtle, seldom disturbed by the natives, who do not eat them. The general soundings in the centre are 20 to 30 fathoms, but several small coral patches are scattered about.

Hea-wandu, near the Atoll's south end, is the principal island, being the residence of the Sultan's Wazír; it contains 150 inhabitants, good water, and some supplies. It is of triangular form, nearly one mile in greatest length; the margin is composed of coral thrown up some 12 feet above the level of the sea. The west side of the island is thickly planted with cocoa-nut and bread-fruit trees; the north and east sides have a thick brush-wood; but the interior, which is 3 or 4 feet lower than the sides, has been cleared for the cultivation of a small grain called *bimbi*, which, with a few sweet potatoes, pumpkins, and limes, and the cocoa-nut and bread-fruit, are the only vegetable productions; rice is imported from India, but only the richer inhabitants can afford it; the bonito fish is caught in great quantities, and is the principal article of food. Fowls are abundant on all the islands, but not easily procured, being so wild and difficult to catch. Money will not fetch its full value, as the natives have so little use for it; rice, tobacco, and betel-nuts are the best medium of barter.

Openings.—One long barrier reef forms the west * side of the Atoll; its south extreme is also a barrier reef. Between the two reefs there is an excellent passage with 12 fathoms water, opposite which, at the distance of one mile within the line of boundary, stands the island Hea-wandu. Along the eastern margin of the Atoll there are nine islands; the southern one marks the east extreme of the south barrier reef, and may be passed quite close along its north side. Between all the other islands (except between the two large eastern ones, Gamatacan and Mura-du, which are connected by a reef,) there are passages for ships, but that between Gulandu and Mura-du has two shoal coral patches with only a few feet water on them, each being equidistant from one island and the other shoal, and so making three passages out of the broad space of 3 miles between those islands.

* On this the ship *Vicissitude* (from Mauritius to Ceylon) was wrecked in 1836, during the night, with westerly winds.

Anchorage.—Vessels bound to Hea-wandu from the eastward, had better avoid the above shoals by passing close to Gulandu island on either side. In coming from the westward, Hea-wandu will appear as the southernmost tree island of the Atoll, and may be steered for when bearing E.N.E. In the S.W. monsoon a ship could anchor between the east side of Hea-wandu and a small reef dry at low water at half-a-mile off shore. In the N.E. monsoon the best anchorage is off the south-west side of the island, in 16 and 17 fathoms water, to the northward of the barrier reef which bounds the Atoll's south point.

TIDES.—At the head of the Maldivhs, the tides are extremely irregular and at all times influenced by the prevailing winds and currents; thus in the N.E. monsoon the ebb stream seems to run longer than in the opposite season. During strong westerly breezes the flood sets to the eastward for the greater part of the day; but when the wind moderates, the ebb takes its turn and sets westward in like manner, the water falling half-a-foot lower than it ordinarily does at springs. The rise and fall is about 5 feet, and the streams run about $1\frac{1}{2}$ miles an hour. High water at full and change, 9 h. 30 m.

CURRENTS.—The currents, about the northern part of the Maldivh chain, set to westward from December to April inclusive; from May to August they set to eastward and N.E.; about the middle of September they turn southerly, and continue so till the squally period in December, which ushers in the N.E. monsoon.

The EIGHT-DEGREES CHANNEL.—This space of sea, 70 miles in width, between the head of the Maldivhs and Minikoi island, is perfectly safe, and adopted by vessels bound to the Malabar coast or Colombo during the S.W. monsoon, and bound to Bombay or more northern ports at the close of that monsoon in November, when the north-westers of the Malabar coast are over and its land winds are pretty well established. It will be prudent to keep nearer to Minikoi than to the Maldivhs, as the current sets to the southward between the end of September and the close of the year. In the strength of the S.W. monsoon, mid-channel is the best track, or rather inclining towards the Maldivhs.

The currents in this channel are much the same as at the head of the Maldivhs, but in the N.E. monsoon they at times set to N.W., and northward when southerly winds occur, but very rarely.

MINIKOI ISLAND, or Malikoi, though generally spoken of as one of the Lakadivh group, is upwards of 100 miles from them, and 68 miles to northward of the Maldivhs. It is very populous, and the natives are hospitable, being under the jurisdiction of the British authorities in Malabar. The erection of a lighthouse on Minikoi is in contemplation, as the island lies

right in the track of mail steamers from Point-de-Galle to Aden ; one of them was lately stranded there. To give a general notion of the relative position of Minikoi to the Malabar coast, it may be stated as being nearly in the latitude of Cape Comorin, from which it is distant 270 miles.

The island is a narrow strip of low land, 7 miles long, lying north-east and south-west, and an irregular coral reef projects from its north-west face about 3 miles, and joined to the extremes of the island ; but on the south-east side there is no reef. On the reef near the west point of the island there is a small islet with trees. At the north end there is a passage through the reef with a greatest depth of 2 fathoms, through which boats and small vessels pass, but it is narrow and intricate. Where the boats lie inside the reef the water is deeper, 2½ and 3 fathoms over a bottom of hard coral. The island is well planted with cocoa-nut trees, about 70 feet high, and visible from a vessel's deck 10 or 12 miles.

The NINE-DEGREES CHANNEL, bounded on the south by Minikoi and to the northward by Seuheli-pár and Kalpéni islands, has a width of 108 miles. It is used, as the Eight-Degrees channel, at the close of the S.W. monsoon by vessels bound to Bombay ; or in the strength of the S.W. monsoon by vessels bound to Cochin or Ceylon, when the route either northward or southward of Minikoi may be adopted at discretion.

The LAKADIVH ISLANDS,* or Lákra-divh group, consist of a dozen small islands with a few detached reefs and banks ; they stand on the verge of steep coral reefs, close to which no soundings are obtainable, therefore great caution is requisite in approaching any of them in thick weather or in light winds. Being all so low, with cocoa-nut trees only 50 or 60 feet above the sea, these islands are not discernible at any distance, and therefore are commonly and prudently avoided by navigators ; but amongst them there are safe and wide channels through which a ship may extricate herself if, by any error in reckoning or otherwise, she gets amongst them. The group belongs partly to the British Government, partly to the Bibi of Cannanore, with which place these islanders have their principal trade.

SEUHELI-PÁR, the south-west danger of the Lakadivh group, is a reef with two islands, very small and low, each less than 2 miles in circumference, the one bearing N.N.E. ¼ E. from the other, distant 6 miles. The northern island stands at the extreme north-east margin of the reef, which dries at low water, and hence extends in a south-west direction for 11 miles, of an oval shape, slightly indented at about 3 miles to W.S.W. of that island, where there appears to be an opening into the lagoon. A coral bank of

* *See* Chart:—Lakadivh group, No. 93 ; scale, $m = 0{\cdot}1$ of an inch.

soundings with 4 and 5 to 9 and 11 fathoms water projects about one mile to northward of the north island, and thereabouts appears a passage into the interior, through which boats can proceed to the southern island, which stands more than one mile within the boundary of Seuheli-pár on its south-east side.

The islands are well wooded but not inhabited, except when boats come from the other Lakadivh islands in the fair season to fish. The water procured by digging is salt and unfit to use; a soft kind of wood, which will do for fuel, may be got on the northern island, but the other abounds most with cocoa-palms, the nuts of which are of a saline and unpalatable taste; this southern island is in latitude 10° 0′ N., and longitude 72° 12′ E., and the reef extends rather more than 5 miles S.W. by W. from it.

Caution.—The Seuheli-pár reef, being deep-to, should be approached with great caution; many of the black rocks on it are considerably elevated above low water mark, but at high tide its boundary is nearly all submerged. The account given by the officers of the ship *Anne* (from the Red Sea), wrecked about midnight of April 9th, 1804, makes another reef to lie several miles on a N.W. bearing from the Seuheli-pár islands, but Captain Moresby could discover no appearance of danger about the situation assigned to *Anne's* reef, which was probably the edge of the great reef, the estimated distance from the islands having been over-rated at the time of the misfortune.

KALPÉNI, the south-easternmost of the Lakadivhs, bearing nearly East 79 miles from Seuheli-pár, is composed of two narrow low islands, standing on the east side of a lagoon reef, nearly 7 miles long north and south, and about half as broad. The southern or largest island (Kalpéni), which is inhabited and well planted with cocoa-nut trees, has soundings of 9 or 10 fathoms, coral bottom, off its south end; from this the barrier reef extends round the west and north, and joins the north end of the northern island (Chéria). This reef is deep-to, with high breakers, and no soundings obtainable till close to the surge; through one part of it there is a narrow passage into the lagoon, with only 1½ and 2 fathoms water, but from 3 to 4 fathoms are found on the coral flat inside. The boats of the natives lie at the south-west part of Kalpéni, on a nearly south bearing, and about 3 miles distant from the gateway or passage through the reef.

UNDEROO ISLAND, or Underoot, bears N. ½ E. 38 miles from the north end of Chéria, and the channel between them is clear of danger. This island, which is 3½ miles long, east and west, and less than half as broad, is low and well planted with cocoa-nut trees; it is defended by a wall of coral rocks all round, through which there is only one small pas-

sage for boats. The south side is very deep-to, and affords no anchoring ground, but vessels can anchor off the east point of the island in 10 or 12 fathoms, sand and rock; and on the north-east and north an extensive coral bank projects some 6 or 8 miles, with various depths from 8 or 10 fathoms to 16 fathoms.

About a mile from the island, the bottom on this bank of soundings is sandy in 10 or 12 fathoms, where vessels might anchor during southerly winds abreast the houses scattered along the north side of Underoo. In the N.E. monsoon, vessels can anchor in 10 or 12 fathoms, about half-a-mile from shore, with the extremes of the island bearing from N.N.E. to E. by S. Turtle may be got here; the water is tolerably good; the natives are poor and inoffensive. Underoo is the nearest island to the Malabar coast; Mount Dilly bears from it N.E. $\frac{1}{2}$ E., and is distant 113 miles.

ELICALPÉNI BANK, of circular form, nearly 5 miles in diameter, bears N.E. by N. from Underoo, 28 miles. Its centre is in latitude 11° 13′ N., and longitude 73° 57′ E. With reference to the Malabar coast, it is in about the latitude of Calicut, from which place it is distant 100 miles, but it is only 83 miles on a S.W. by W. bearing from Mount Dilly. It is composed of sharp coral rocks; the least water found during an examination of two days with three vessels, was 6 fathoms, but it ought to be avoided by large ships, particularly in the S.W. monsoon, when the high sea might cause a vessel to bump on it. The barque *Premier* had soundings on it, varying from 9 to $3\frac{3}{4}$ fathoms, in latitude 11° 16′ N.; therefore it may probably extend more to northward, or have a less depth than shown on the charts.

CABRUTI or COORUTI ISLAND, bears N.E. $\frac{1}{2}$ N., and 32 miles distant from the northern Seuheli-pár island, and W.N.W. 62 miles from Kalpéni; the channel between them being (so far as known) clear of dangers. Cabruti is a low island, nearly 3 miles in length, north-east and south-west, by one mile in breadth; trees are visible from a ship's deck, about 10 or 12 miles. Although not large this island is valuable to the natives, by affording good water, and two species of excellent cocoanuts. A steep coral reef encompasses the south and west sides of the island (forming a lagoon within), projecting out more than a mile * in some parts; the east side is also steep and rocky. The proper entrance to the lagoon is at the north-east end of the island, but the boats of the natives pass through other parts of the reef.

On the extremity of the reef, at the south-west end of the island, there is a coral spot, where a vessel might anchor in case of necessity, with a

* Fully 2 miles, according to the Chart.

chain cable. The tides or currents run here at times 2 miles an hour; they never set direct upon any of the islands, but generally along them, or along the edges of the reefs, thus lessening the danger to be apprehended in calms. The flood sets to N.E. and ebb to S.W.; the former is nearly nullified by the current in the N.E. monsoon, as is the case among the Maldivhs. (*See* page 275.)

PITI is a sand-bank about 6 feet above the sea, without any shrubs or verdure, bearing N.N.W. 15 miles from the north end of Cabruti, and about S.S.W. from Améni. This sandy isle or bank seems to present an area of not more than 2 acres, and probably the sea makes a clear breach over most of it in the S.W. monsoon. It is generally covered with birds, and on its east side there is a black rock resembling a wreck. To the east and south of it, there are soundings of 6 and 4 fathoms, a part of the great bank whose description follows.

Bank of Soundings.—From Piti an extensive rocky bank of soundings projects 9 miles to the N.W. towards Tingare, and about 20 miles to N.N.E. towards Améni; indeed, the chart makes it join the plateau on which that island stands. From Améni, the eastern side of this bank runs down S. by W. for 10 miles, then nearly South for a like distance, on the meridian of Cabruti till a mile or two below the latitude of Piti sand. More ancient accounts make it extend some 9 miles E.S.E. from Piti. The soundings range from 6 to 20 fathoms, the smallest depths being near Piti, and at 6 to 8 miles from Améni.

AMÉNI, in latitude 11° 6′ N. and longitude 72° 41′ E., is a nearly round island, about 1½ miles in diameter, and surrounded by rocks to a small distance; close to those on the south side there are soundings of 8 and 10 fathoms where a vessel can anchor in the N.E. monsoon; between these soundings and the north-east extremity of the bank extending from Piti, Horsburgh says, there *appears* to be a narrow gap of deep water; this is uncertain and unlikely, for a depth of 14 fathoms was found at 3½ miles distance on a west course from where the E.I.C. surveying brig *Taptee* was anchored in 8 fathoms to southward of Améni, with extremes of the island bearing between N.N.E. and W.N.W.; and intermediate casts of 10 fathoms water were found.*

CARDAMUM, is a long low island, at the distance of 5 miles N.N.E., from Améni, and that bearing is the direction in which the island has its greatest length, which is 4 miles. On its west side a coral reef stretches out nearly 2 miles, embracing both ends of the island, but extending more

* The islanders reported a shoal bank to lie 10 miles N.W. from Améni, but a fruitless search for it was made by the *Taptee.*

from the south end than from the north. Near the south point of the reef there are said to be soundings of 16 ond 20 fathoms, nearly half-way towards Améni, but these are not exhibited on the chart.

AUCUTTA ISLAND bears N.W. ½ W. 32 miles from Cabruti, which it much resembles in shape, size, and the direction in which it lies. It is well inhabited, planted with cocoa-nut trees, and seems a little higher than the small islands in its vicinity. At the distance of a mile from its south-west point, and joined to it by a reef, is the little island Calpúti, with soundings off its south side; this is in latitude 10° 49′ N., and longitude 72° 9′ E., and the north-east point of Aucutta bears from it N.E. by N. 4 miles. Both islands are on the same coral reef which projects more than a mile westward of Calpúti and nearly 2 miles westward of Aucutta. From Calpúti, the Piti sand bears E. by S. 23 miles.

Horsburgh states that "On the edge of the reef directly west from the northern extremity of the island, are soundings where a vessel might anchor in case of necessity, but the bottom is coral rock." The chart, however, does not show such a spot, but to northward and N.E. of Aucutta there is a very extensive plateau of soundings connecting it with Bingaro and Tingaro islands, and a vessel could anchor in the N.E. monsoon in 7 or 8 fathoms about 1½ miles off the south-west side of Bingaro.

Bingaro and Tingaro are two small islands encircled by a coral reef which projects about 1½ or 2 miles to N.W. and the same distance to west and south of the former island, whilst it forms a semi-circle with a radius of one mile round Tingaro, the east side of which is deep-to. Horsburgh describes this reef as projecting from 4 to 6 miles N.W. and West from Bingaro, but the chart exhibits a fine bank of soundings extending from one mile to 4 miles west of the island, and down to Aucutta as mentioned before; this bank has soundings on it, from 6 to 7 fathoms near Bingaro to 10 to 15 fathoms near Aucutta, and ships might occasionally anchor on it with a chain. Tingaro lies about 2 miles E.N.E. from Bingaro, and is in latitude 10° 56′ N.; from it the nearest part of the bank of soundings, that extends several miles northward of Piti, bears about E.S.E. 9 miles.

PEREMUL-PAR is a reef taking the form of an equilateral triangle, the apices pointing to south, north-west, and north-east; near the latter point there is a small low isle or sand-bank within the reef at about 3 miles from the north-east extreme tip. The south point of this reef bears N.W., and is 18 miles distant from the centre of Aucutta island; there are soundings close to the reef on the south-west side and round the north-west point or angle.

BETRA-PÁR (the north-western one of those reefs of the Lakadivhs which have tree-islands to distinguish them), bears N.N.E. from Peremul-pár sand-bank, the channel between them being 18 miles broad. The island Betra-pár, lying at the north extremity of the reef, is small and low with some trees on the northern part, in latitude 11° 35′ N., and longitude 72° 9′ E. Close under its south side there is a gap in the reef, with 2 fathoms water, where in fine weather a small vessel might lie for a short time; and a ship may anchor during N.W. winds in 6 or 7 fathoms water very close to the reef with the centre of Betra-pár island bearing N.N.W. ½ W. distant about one mile. There is a little sandy isle near the east face of the reef at 4 miles to the southward of the tree-island, and the reef extends 2 or 3 miles more southerly still. Both south and west sides of this reef seem to be less wall-like than those of the Maldivhs, for a depth of 12 fathoms is shown on the chart off its south extreme, and the ship *Grantham*, which ran on to the west part of this reef, October 8th, 1713, succeeded in heaving off by a kedge laid out in deep water.

KILTAN ISLAND, bearing East from the south extreme of Betra-pár reef, and N.E. 19 miles from the north end of Cardamum, is 2½ miles long in a direction of N.N.W., and opposite. The island is inhabited, and well covered with trees; it is quite steep-to along its east face, but on its western side has a fringing reef, which extends about three-quarters of a mile from the island, and beyond that a narrow bank of soundings, which off the south end of the island extends no more than one mile, but affords anchoring ground in 5 or 6 fathoms water, about 3 cables' lengths off shore.

The best anchorage for communicating with the shore is off the N.W. point of Kiltan, in 7 or 8 fathoms water only about 3 cables' lengths from shore. This position is abreast of the landing place, within the fringing reef, which has but a narrow passage for boats.

CHITLAC, the northernmost island of the Lakadivhs, in lat. 11° 41′ N., and long. 72° 42′ E., bears from Kiltan N.W. by W. 20 miles, and E. by N. from the north end of Betra-pár, from which it is 32 miles distant. It is about 1½ miles long north and south, its east face steep-to, but a coral reef stretches round its west side in a semicircle of three-quarters of a mile radius, having a narrow bank of soundings outside which extends to north and south of the island, affording anchorage in fine weather. The island is well planted with trees, and inhabited; the water is pretty good, and excellent poultry, though in small quantity, may be procured.

The best anchorage in the N.E. monsoon is off the south end, in 8 or 10 fathoms water, with the extremes of the island bearing between North and N.E. by N., and the west extreme of the barrier reef N.N.W.; this position is only about 4 cables' lengths from the island. It is best to

employ a native boat in communicating with the shore. Chitlac, as well as Kiltan, belongs to the British Government, whose representatives are a few peons from Calicut, in the province of Malabar.

BYRAMGORE REEF, or CHERBAPÁNI, is 10 miles long N.W. and S.E., but including the bank of soundings off its north end, the extreme length is more than 12 miles, and its breadth 5 miles. The south-east point of the reef, which dries at low water, is in latitude 11° 48′ N., and longitude 71° 50′ E., bearing N.W. by W. 24 miles from Betra-par island, and the channel between is safe. There is a narrow bank of soundings off the east, south, and west sides of this reef, but that on the north is 3 miles broad, with overfalls of 6, 4, and 8 fathoms water; but there may be a less depth, for it is studded with coral rocks, which are plainly visible under a vessel's bottom.

The coral rocks forming the reef are discernible at low water; but, as this and the Beleapáni reef are so deep-to, the approach at night is very dangerous, as the noise of the surf would not be heard unless a ship were to leeward in calm weather; and the current frequently sets 12 or 15 miles during the night in uncertain directions, especially in the unsettled weather at the change of monsoons, although usually between S.E. and S.W. during February, March, and April. The ship *Byramgore* was totally lost on the south end of this reef on November 17th, 1827, and it is believed that this is the reef on which the ship *Competitor* struck in the night of August 21st, 1827, but fortunately backed off and reached Bombay.

CHERBANIÁNI REEF, or BELEAPÁNI, the northernmost dangerous reef of the Lakadivhs, is a long oval reef, 7 miles in length north and south, and its south end bears N.N.E. from the north end of Byramgore bank, leaving a fair channel of 18 miles between them. There are sand-banks on the north and east sides; by the latter there is a passage into the interior for boats. At the south end there are a few coral rocks, which seem always to be above water, but the greater part of the boundary reef is only visible towards low water. The east, north, and north-west sides are as steep as a wall, but off the south and south-west sides a bank of soundings extends nearly a mile, and on this vessels can anchor in the N.E. monsoon, in 9 or 10 fathoms water. The extent of the reef is from latitude 12° 17′ to 12° 24′ N., and the longitude of its south point 71° 52′ 30″ E., or 1° 53′ West of Goa lighthouse, by chronometer.

Tides.—At the Cherbaniáni and Byramgore reefs, as well as at Kiltan and Chitlac, the spring tides rise 6 or 7 feet, and neaps 3 feet; the flood sets to N.E. and ebb to S.W. The ebb stream runs strongest and longest, for 8 to 10 hours together at springs, during the N.E. monsoon, when the drain of current runs with it; at that season the flood stream

is scarcely perceptible, although the regular rise of tide is visible on the reef. High water occurs at 10h. 30m. at full and change of moon.

BASSAS DE PEDRO, or PADUA BANK, called Munyal-pár by the Lakadivh islanders, is a large bank of soundings of crescent form, concave to the east, ranging over a space 70 miles in length by 10 to 15 miles in breadth, or between latitudes 12° 30′ and 13° 40′ N., and between the meridians of 72° 15′ and 72° 45′ E., having on the northern part soundings from 22 to 28 fathoms, and on the southern part 26 to 34 fathoms, sand, shells, and rotten coral; the water on the bank is not discoloured, so as to indicate soundings, and the edges of it are steep-to.

SESOSTRIS BANK, discovered by the E.I.C. steam frigate of that name in 1847, lies about 15 miles to westward of Munyal-pár, between the parallels of 13° 0′ N. and 13° 15′ N., and between the meridians of 71° 52′ E. and 72° 5′ E. The general soundings on it are from 18 to 28 fathoms, but near both north and south extremes, casts of 11 and 12 fathoms were found; the sides are steep-to.

CORA-DIVH, formerly called Little Padua bank, lies to N.N.E. of Sesostris bank, and to N.W. of Munyal-pár, or between latitudes 13° 34′ and 13° 52′ N., the centre being in longitude 72° 10′ E. The soundings on this bank range between 24 and 29 fathoms, the bottom sand, decayed coral, and broken shells; its length is 20 miles in a N.N.E. direction, and opposite; its average breadth 6 miles.

CHAPTER XII.

WINDS IN INDIAN OCEAN AND NEAR MALDIVHS AND LAKADIVHS. —CURRENTS.—VARIATION.—PASSAGES FROM THE CAPE OF GOOD HOPE TO HINDOSTAN.

INDIAN OCEAN.—The S.E. trade wind in the Indian Ocean is found between the parallels of 10° and 28° S., from the west coast of Australia to within a few degrees of Madagascar. Its northern limit varies with the season, changing 2 or 3 degrees to the north or south, according as the sun has north or south declination. When the sun is in the northern hemisphere, and at its greatest distance from the equator, the wind veers more to the southward, varying from S.E. to S.S.E.; and when in the southern hemisphere, it takes a more easterly direction, varying from E.S.E. to East, and sometimes to E.N.E. To the southward of this trade, as in the Atlantic, the prevailing wind, or *anti-trade*, is from N.W., this is met with during the greater part of the year.

In the other parts of the Indian Ocean, and in the adjoining seas (owing to the interference of large masses of land), the year is divided into two seasons or *monsoons*. The winds to the northward of the equator blow S.W. from the middle of April to the middle of September, and N.E. from the middle of October to the middle of March; and their limits are from the equator to lat. 23° or 24° N., and from the east coast of Africa to the coasts of India, China, and the Philippine islands; and their influence is often found in the Pacific Ocean as far as long. 145° E., and to the northward as far as the Japan islands. In the middle of the Bay of Bengal, and near its eastern coast, towards Malacca strait, calms are frequent, especially in February, March, and April. In the northern part of the bay the regularity of the monsoons is lost, and the winds are unsteady.

The monsoons to the southward of the equator blow S.E. from the middle of April to the middle of September, and N.W. varying to W.S.W. from the middle of October to the middle of March, and their limits are from the equator to the parallels of 10°, or 11° S. in the Indian ocean, and to 12° and 14° S. in the west part of the Pacific, and from near the coast of Africa eastward as far as 138° W. The N.W. monsoon is subject to many irregularities, and rarely blows either strong or regular, except in December and January, at which time it occupies a zone comprised between lat. 10° or 12° S., and 2° or 3° N. The S.E. monsoon, which is

the period of the fine season south of the equator, may be considered an extension of the S.E. trade, which blows as far as the equator, when the sun is near the northern tropic, and recedes to 10° or 11° S., when the sun is near the southern tropic.

MOZAMBIQUE CHANNEL.—The S.W. monsoon is the fair season, and begins in April and continues till November. The winds vary during this monsoon from S.W. to S.E., and E.S.E. particularly near the south end of Madagascar; close to the African coast land breezes are frequent. In mid-channel they are more steady, and generally blow right through; there are, however, exceptions to this, for in the southern part of the channel light variable winds and westerly currents have sometimes retarded vessels bound to India through this channel.

The N.E. monsoon commences in November and prevails until April. In the northern part of the channel it begins early in November, but towards St. Augustine bay not till the end of the month, and seldom extends farther south; the prevailing winds varying from S.E. to S.W., during both monsoons, between Cape Corrientes and the south-west part of Madagascar. Squalls from West to N.N.W. sometimes happen during the S.W. monsoon, but never continue long. It is chiefly during the N.E. monsoon that storms occur, when S.E. and S.W. winds, which prevail without, are blowing strong. These winds blow into the channel and are resisted by N.E. and N.W. winds, which produce a high turbulent sea, and sometimes whirlwinds, by their opposing force. The sky is then overclouded, and the rain heavy.

EAST COAST of MADAGASCAR.—It has been already observed in page 290, that the S.E. trade does not extend as far as the Madagascar coast. On the east coast of this island, and in the Mozambique channel, the monsoons are regularly established. The N.E. monsoon, varying to N.N.E., blows from November to April, and the S.E. monsoon from April to November; this last period of the year is the fine season. However, in the south-east part of Madagascar, N.E. winds are generally found, which, veering round the coast, blow as far as Cape St. Mary, and west of this cape, and off the south-west end of Madagascar, they blow from S.E. to South during the whole year, but do not reach far to the northward along the west coast of the island. Land winds are not known at Madagascar, and those above mentioned, that blow on the coast, commence about 8 or 9 a.m., freshen up towards noon, when they blow strong, and continue so till 3 p.m., and gradually abate towards sunset.

SEYCHELLES and CHAGOS ISLANDS.—From the equator to 12° S. lat., in which belt these islands lie, the S.E. monsoon prevails from May till

November, which is their fine season, and the climate is said to be delightful. The N.W. monsoon, the rainy season, during which the winds vary between N.W. and W.S.W., is from the middle or beginning of December to the beginning or end of April. In December and January the weather is very sultry, and the rains fall with greatest violence."

The Mauritius hurricanes do not extend to Seychelles, their equatorial limit being 10° S. latitude. Being thus favourably situated, these islands are sometimes resorted to by English and French men-of-war to spend the hurricane months at.

At the Chagos archipelago the winds are much the same; the N.W. monsoon or rainy season is from the middle of December to the middle of April. In the latter month and part of May the winds are variable. From June to September the easterly monsoon (which is in reality only the S.E. trade blowing up towards the line) prevails, the wind occasionally veering to E.N.E., but mostly at E.S.E. In November and part of December the winds are again variable.

MALDIVH ARCHIPELAGO.—As the Maldivhs occupy a space of nearly 8° degrees of latitude, and are partly south of the equator, it may be expected that their climate will be influenced on the one hand by the N.W. monsoon of the Chagos and Seychelles, and the S.E. trade when it blows up to the line; on the other hand by those atmospheric disturbances which usher in the N.E. monsoon of Hindostan and Ceylon. Therefore it is deemed necessary to give a separate description of the winds that are experienced at both north and south extremes of this long chain of islands.

Southern Maldivhs.—Ad-du Atoll, being 40 miles to the southward of the equator, is almost without the influence of the regular Indian monsoons; the winds and weather being very variable, subject to squalls and rain. The N.E. monsoon is felt in January, February, and March, the winds generally from North and N.E., but occasionally from westward of North, and the weather is less cloudy and rainy than when the S.W. monsoon prevails northward of the line. In April and May the winds are variable, but mostly from the westward. From May to December the winds are from West to South and S.S.E., with much rain and squalls. About the middle of the latter month, which is about the time that the S.E. trade finally retires southward, and the N.W. monsoon commences below the equator, hard squalls and fresh gales from West to W.N.W. with heavy showers of rain occur at the Equatorial channel, lasting for a fortnight about.

Máli Atoll.—This central part of the Maldivhs marks a great difference in the weather during the N.E. monsoon, for the southern groups then

experience frequent squalls and rain with variable winds; whereas to northward of Máli, that is the season (as at the Lakadivhs) of fine weather and generally moderate breezes. There is no such marked difference in the S.W. monsoon.

Northern Maldivhs.—At Hea-wandu Pholo Atoll, the head of the Maldivhs, the N.E. monsoon is steady from the middle of December to the end of February, between N.N.E. and E.N.E., moderate and light breezes, with slight showers of rain about every fortnight. In March and April the winds incline more northerly and north-westerly,* until in May the S.W. monsoon commences, and lasts four months only. In September the winds become North-westerly, but occasionally Westerly squalls accompanied by rain; in October the winds are moderate and variable from W.S.W to North, when the weather is cool and pleasant, but occasional hard squalls occur with heavy showers of rain at about the same period as the Bombay *elephanta*. In November the winds are light between N.N.E. and N.N.W., with occasional Easterly squalls; after the middle of the month there occurs a period (about one week) of dark cloudy tempestuous weather, with long continued rain from the westward; this seems to be at the same time as the change of monsoon in the gulf of Manár; after which the N.E. monsoon is fairly established, and throughout December is steady at E.N.E., with pleasant and clear weather, but occasional squalls and rain from about E.S.E.

LAKADIVH ISLANDS.—The winds and weather in the vicinity of Minikoi island are much the same as experienced at the head of the Maldivh group, and at the same time differing little from those amongst the northern islands and reefs of the Lakadivhs, amongst which the E. I. C. surveying brig *Taptee* spent one entire fine season from November to April.

At the commencement of the year the N.E. monsoon is at its height, but, though steady, very light indeed, seldom attaining to a moderate breeze, unless the wind hauls to the North point or a little westward of it, when a fresh breeze may occur for two or three days. Towards the end of February there remains very little easting in the wind. In March, it is usually North throughout the day, and N.W. between sunset and sunrise, being strongest about midnight, a fresh breeze.

In the beginning of April, lightning begins to exhibit at night, and in a few days sharp squalls with rain occur in the evening or early night, from the S.E. quarter, and sometimes from West, strong N.W. winds succeeding them for three or four days; therefore April must be considered an unsettled month when a Southerly gale, sometimes of a cyclone character, is

* In April gales and squalls may be expected from uncertain directions, as they frequently come from cyclones not far off. (*See* pp. 11 and 12.)

likely to happen along the Malabar coast (*see* pages 11 and 12). The *Cleopatra's* cyclone of the middle of April 1847 was felt among these islands, commencing at N.E., round by North to N.W., the vortex of the gale passing between them and the coast, but very close to the easternmost islands of the Lakadivh group, over which the storm wave committed much havoc.

In the month of May the winds are mostly N.W., but occasional S.W. breezes and a swell from that quarter herald the S.W. monsoon, which is fairly established before the end of May and lasts till September, when the wind hauls to the N.W., and during that month and October hangs between N.W. and North, and in November between N.N.W. and N.N.E. In this latter month Southerly gales have been experienced at Bombay and along the Cánara coast (*see* page 12), and N.E. and S.E. gales to northwestward of the Lakadivhs; these atmospheric disturbances occur about the same period as the tempestuous weather at the head of the Maldivhs, or a little later than the burst of the Madras monsoon, which is usually ushered in by a gale. For the first half of December the wind hangs much at the North point, sometimes getting to N.N.W. and blowing fresh for two or three days; in the latter half it gets more easting and may be fairly called the N.E. monsoon, but it is of little strength, seldom attaining to more than a royal breeze.

CURRENTS OF THE INDIAN OCEAN AND ARABIAN SEA.

The surface drift, which affects a vessel's passage, is all we are yet acquainted with, and will be described in these Sailing Directions, according to the seasons of the year. At the summer and winter solstices the currents are very different, and yet most of the works on physical geography (of which no two agree) group them together as if there were no periodical changes.*

The Trade Drift is a westerly current occupying, at the period of our English winter, the same space of latitude as Madagascar, and extending from near Australia to Madagascar, round the north end of which it runs Westward with great velocity towards the Comoro islands where it unites with the Indian N.E. monsoon current, and flows down the Mozambique channel, to the southward of which it is re-joined by, or runs parallel with that part of its waters which passes southward of Mauritius and Madagascar. Across the Middle and Outer passages (*see* page 300) it has no strength of any consequence, the average being about half a mile an hour, but at the north end of Madagascar it runs 40 or 50 miles a day.

* Our knowledge of the sub-marine currents is little, and mainly theoretical.

When the sun is at greatest north declination and the S.E. trade blows up to the equator (which period is also that of the easterly monsoon among the islands between Borneo and Australia), the trade drift is augmented by the current from the Torres straits, and flows westward past the Chagos and Seychelles groups till within 200 or 300 miles of the African coast, along which it is forced northward by the southerly breezes of the Mozambique channel, which also have the effect of turning the Mozambique current northward in June, July, and August.

The Chagos and Seychelles Currents run generally with the wind; for four months, June, July, August, and September to the west, varying occasionally a little to north or south of that direction; in October, November, and part of December they are very variable (whilst the S.E. trade is *backing down* from the line as the sun goes southward); from the middle of December to middle of April they run to eastward propelled by the N.W. monsoon; in the latter part of April and all May they are again variable.

The Equatorial Channel Currents are very strong; for half the year they set westward, and for the other half eastward, according to the monsoon, but are subject to checks from variable winds. In June they commence to set eastward and last till the end of December, but in July and August when the S.E. trade blows (but with interruptions) up to the equator, a westerly set has been experienced between Ad-du Atoll and Phua Molóku;* thus showing how the current obeys the prevailing wind, for most vessels have found throughout July and August an easterly set of 50 or 60 miles a day through the Equatorial channel. In January the current begins to set westward, receiving its impulse from the N.E. monsoon of the Bay of Bengal.

The Maldivh Currents.—No general description will do for the currents in the many channels that exist amongst this chain of islands, and as yet there are but few recorded observations, and these are for only a very small portion of the year. Regular tides also occur throughout the group, and a tide may be mistaken for a current. As a general rule the currents set eastward from June to September, then southerly along the west side of the islands till December, in the end of which month they commence setting westward, and run in that direction till April. In May they are variable and uncertain till the S.W. monsoon is established.

Currents about Minikoi.—As the N.E. monsoon blows strong through the gulf of Manár and over the low northern half of Ceylon, in January and February the westerly current runs strongly along the south end of that island, and seems to continue its westerly direction till it meets

* Ship *Contractor*, July 27 to July 29, 1792.

with an obstruction in the long Maldivh chain, turning to the northward close along the northernmost Atolls towards Minikoi island, thence north-easterly and curving down again to S.E., thus forming a whirl (in the direction of the hands of a watch) to eastward of Minikoi.* This may explain what Horsburgh mentions, that the current sometimes in the N.E. monsoon sets to the N.W. and northward. In April and May it is variable, but generally southerly with the northerly winds that prevail until the S.W. monsoon brings its easterly current of cool water, which the S.E. trade has brought with it up to the equator, and which had commenced its N.E. set up the African coast early in April. Near Minikoi the current sets in August E.S.E. and in September S.E., for the remainder of the year between S.E. and south.

The Lakadivh Currents are very weak, and with the wind during the N.E. monsoon, only tending generally to make the ebb stream run stronger and longer, whilst that of the flood tide is reduced to one or two hours only (*see* tides, page 288); there is sometimes a set to the northward when the winds are light and variable, especially after the brisk northerly winds that prevail for two or three days at a time during the N.E. monsoon, or rather during the *north-wester* season of the Malabar coast (*see* page 9), when there is almost always a southerly drain along the shore of Hindostan. From June to September the current sets easterly, and with considerable strength at times, gradually turning more southerly in July, till in October it is S.E., and for the rest of the year very feeble and variable according to the wind.

An excellent proof of the strength of the Lakadivh and Malabar current in the S.W. monsoon has been given by the washing-up of a seaman's chest near Amblangodde, about 20 miles to southward of Colombo on July 24th of this year; it came from the ship *General Simpson*, from Bombay bound to Liverpool, wrecked on Chitlac island on June 19th. There seems a little uncertainty about the day when the chest started on its voyage, but the master of the vessel left her with cargo entire on July 10th. Assuming that as the date, the current was 36 miles a day in a mean S.E. direction.

VARIATION OF COMPASS.—In the several passages from the Cape of Good Hope to India, attention must be paid to the Westerly variation of the magnetic needle, which amounts to 30° off the south end of Africa; 20° off the south end of Madagascar; 10° at Mauritius; and so decreasing till at the Maldivhs there is none; then along the west coast of Hindostan

* E. I. C. surveying brig *Palinurus*, 1853. Captain Selby states, on native information, that the current in January and February always sets past Minikoi to the northward.

it becomes Easterly, but so trifling in amount that for all practical purposes no notice need be taken of it. However, the rapidly decreasing variation from the Cape to the equator must be specially attended to by navigators.*

PASSAGES FROM THE CAPE TO HINDOSTAN.

GENERAL REMARKS.—The route to be selected from the Cape of Good Hope to the West Coast of Hindostan must depend on the season of the year, and therefore on the monsoon that is then blowing; and of course there will be a material difference in the route, whether a vessel be steering for Karáchi or Cape Comorin.

From the Cape of Good Hope the mariner has the choice of proceeding by the Mozambique channel, or any of the passages to the eastward of Madagascar from April to October, when the S.W. monsoon prevails to the northward of the equator. Their names are,—Mozambique channel, passage east of Madagascar, Boscawen passage, Middle passage, First Outer passage, and Second Outer passage. The First and Second Outer passages are to the eastward of the Chagos archipelago; the First may be taken by vessels bound to the Bay of Bengal, when expecting to cross the equator whilst the S.W. monsoon is blowing in the bay; the Second may be adopted at any time of the year, but it ought certainly to be followed from the Cape by all vessels that may not arrive to the northward of the equator until after the N.E. monsoon has set in.

The MOZAMBIQUE CHANNEL † is more direct than any other for vessels bound to Bombay, Ceylon, or the Bay of Bengal, from April to September, when the S.W. monsoon prevails on these coasts, but it should only be adopted when they are *certain* of reaching their port of destination before it is over; it may also be used at that season by vessels bound for the Red Sea or Persian Gulf. The S.W. monsoon also prevails in this channel during the above period, but it varies from S.W. to S.E. and E.S.E., particularly near the south end of Madagascar, where it blows often from S.E. and East; close to the African coast land breezes are frequent. It would be improper, however, to adopt this route after September, as light baffling winds and strong S.W. and southerly currents frequently prevail in October and November among the Comoro islands. (*See* page 294.)

* *See* Variation Chart, Indian Ocean, No. 2,483.

† *See* Charts, Indian Ocean, No. 2,483, scale, $d = 0{\cdot}3$ of an inch; General Chart of the Coast of Africa, Sheet 5, No. 597, scale, $d = 1{\cdot}3$ inches; and Coast of Africa, Sheet 4, No. 596, scale, $d = 1{\cdot}4$ inches.

On leaving the Cape, if the usual S.E. winds prevail, stand to the southward and run down the easting in lat. 37° or 38° S.; if westerly winds, the easting must be made according to circumstances; but at night or in thick weather, from a position 3 miles to the southward of the Cape, steer to the southward of S.E. by S. to clear the land and reefs off Danger and Quoin points.*

In standing for the Mozambique channel, the mariner must guard against the S.W. and westerly currents which generally prevail between the south end of Madagascar and the Agullas bank, and should not edge away too soon to the northward, particularly if desirous of sighting that island to the southward of St. Augustine bay. At most times it will be proper to gain the meridian of 37° E. before crossing the parallel of 34° or 35° S. From thence a vessel may proceed along the western coast of Madagascar or take the middle of the channel. By adopting the former, the dangers off the coast must be avoided, and in the latter the Bassas da India and Europa island. The middle of the channel is mostly preferred, as the monsoon is generally stronger there than on either shore.

When to the northward of Europa island, a course should be shaped to pass either to the eastward or westward of João da Nova, and to the westward of Chesterfield sand-bank. Caution, however, must be used at night, when approaching Europa island and the Bassas da India, for a vessel might be close to the breakers before they are seen, particularly in hazy weather, which prevails in this channel. Europa island is of a circular form, 3 or 4 miles in diameter, highest at the northern part, with several small hummocks in other places, and a sandy beach. The largest rock of the Bassas da India is about the size of a long boat; the sea breaks all over this dangerous reef. João da Nova is 2½ miles in length, and may be seen 12 miles off; it has a small elevation at the centre, where it is covered with shrubs.

From João da Nova a direct course may be shaped for the Comoro islands, passing through any of the channels between them, or to the westward of Comoro island, as circumstances may require. The current generally sets to the westward among these islands (*see* page 294), making it prudent, if bound to Johanna, early or late in the season, not to fall to the westward, as the winds at these periods are frequently light and variable. In April and May it is said that the best winds are found between Comoro and the African coast, and the northerly current is then strongest along the coast.

From Comoro island a vessel should steer to cross the equator, in 53°

* For more information about the winds off the South of Africa, and the anti-trades and trade winds below Madagascar and Mauritius, the navigator should consult the Board of Trade Charts and Maury's Sailing Directions. A few general remarks only are here given.

or 54° E., and when to the northward of it, a course can be shaped for her destination. Between Comoro and the equator the wind will be found at S.S.E. to South, increasing in strength as the latitude is decreased. If bound to Bombay, a direct course can be steered from the equator, taking care to get on the parallel of Kundári or Kenery island, at a considerable distance from the coast, and then steer due East for it.

DOUBTFUL SHOALS in the INDIAN OCEAN.—Captain Pullen, in H.M.S. *Cyclops*, in 1858, examined the vicinity of several doubtful shoals, and thinks that some might well be expunged from our charts. Firstly, the Brunswick shoal, in latitude 37½° S. and longitude 35½° E., near the reported position of which no bottom was found in two spots 20 miles apart, with 1,280 and 1,000 fathoms of line. Near the position of the shoal reported by two vessels, the American brig *Atalanta* and Dutch ship *Samarang*, three casts were taken of about 1,000 fathoms, one of which brought up a specimen of the bottom. In the very position of the doubtful George island, no bottom was found with 2,000 fathoms. At very nearly the position of Rose Galley rocks, bottom was brought up from a depth of 2,330 fathoms.

PASSAGE EAST of MADAGASCAR.—This route is often preferred to the Mozambique channel, as it is less dangerous, and the winds more steady, particularly in August and September, when light variable winds at times are found in the Mozambique. It may be adopted from February to October, but, like the Mozambique, in using it the mariner must be *sure* of reaching his port in India with the S.W. monsoon.

After leaving the Cape of Good Hope a vessel should get into about long. 52° or 53° E. before she enters the S.E. trade, or crosses the parallel of about 27° S. By meeting the trade too soon, much difficulty may be experienced in making easting, particularly near the south-east part of Madagascar, where E.N.E. winds, known by the name of *fort Dauphin winds*, generally prevail, producing a strong current, which sets to the southward 40 or 50 miles daily near the shore.

In steering to the northward through the trade, keep between the meridians of 51° and 52° E. till past Cape East, or in lat. 15° S.; then edge in and make the land to take a fresh departure from Cape Amber,* which is a low point terminating in a ledge of rocks above water, with several conical hills near it to the southward. The current off the north end of Madagascar generally runs strong to the westward all the year round; from Cape East to Cape Amber it sets along shore to the northward.

From Cape Amber a northerly course should be steered to run between the Farquhar islands (formerly João da Nova) and the Cosmoledo group,

* *See* chart of East Coast of Madagascar, No. 677; scale, $d = 1 \cdot 2$ inches.

and continued to the northward until the islands to the north-east are passed, when with the northerly current the equator will soon be crossed, and the S.W. monsoon will carry the vessel towards Hindostan.

BOSCAWEN PASSAGE.—This passage (and also the middle passage) is more advantageous than the two preceding ones, to vessels bound to Bombay or the Malabar coast, that do not pass the Cape before the 1st September; for they will be nearer the coast and in a better position to reach their port should they meet the approaching N.E. monsoon. It lies between the islands of Bourbon and Mauritius; to the westward of Cargados Garayos and of Saya de Malha bank; and to the eastward of Tromelin or Sandy island, of Agalega or Galega, and of Seychelle islands.

Agale gais a low island, 11 miles long from N.W. to S.E. with a gap in the middle, which gives it the appearance of two islands from a distance; it is surrounded by a reef. Tromelin island is a sandy flat about 15 feet above the sea, having a bank of sand extending S.S.E. three-quarters of a mile from it.

In adopting this route, run down the easting from the Cape between the parallels of 37° and 38° S. until in long. 54° or 55° East, then steer to the northward between Bourbon and the Mauritius. When to the northward of these islands steer the course requisite to the northward to avoid the dangers on either side of the passage, crossing the equator in 62° East, passing to westward of the Lakadivhs, if bound to Bombay, or through the 8 Degrees or 9 Degrees channel when bound to Cochin or Colombo.

The MIDDLE PASSAGE is to the eastward of Cargados Garayos, Saya de Malha bank, and shoals to the northward, and to the westward of the Chagos archipelago, and, as stated above, is taken by vessels bound to the western coast of India and that do not pass the Cape before the 1st September.

On leaving the Cape, make the easting, as before, between 37° and 38° S. and do not cross the parallels of 27° or 26° S. until in about long. 67° or 68° E., in case the S.E. trade should be far to the eastward. On reaching the trade, steer to the northward on the meridian of 66° E., which will lead well to the eastward of the Saya de Malha bank.

It is impossible to say how far the S.E. trade may be carried by this route in September or October, for in these months the winds may be found very different in one year to what they are in another. The currents are also liable to the same changes between the equator and the northern limit of the trade. In the vicinity of the equator westerly and N.W. winds are frequently met, and a vessel must profit by them as much as possible in making northing. To the northward of the equator the N.E. monsoon might not be a foul wind, because at this period it is oftener N.W. than N.E.

When the S.E. trade is lost, in proceeding to the northward, endeavour to keep between the meridians of 65° and 68° E., in case of meeting with light winds and easterly currents near the equator, which might drift the vessel towards the Maldivh islands. In October and November northerly winds may be expected when in lat. 3° or 4° N., inclining more westerly than easterly of the North point; and if every advantage is taken of the favourable changes of wind a vessel will soon get to the northward of the Lakadivh archipelago, and may then stand to the north-eastward for the land. In November, however, it is tedious to pass westward of the Lakadivhs, and it is better to use the 9 Degrees channel and reach the coast of India, when the land and sea breezes will give her a quicker passage to Bombay. Or, if bound to the southern part of the Malabar coast, she may pass through either the 8 Degrees or the 9 Degrees channel; or through the Cardiva channel (*see* page 275), or the 1½ Degree channel if bound to Ceylon.

A vessel bound to Ceylon, adopting this passage in March, April, September, or October, may run to the eastward, keeping nearly on the equator or a little south of it, and pass through the 1½ Degree channel, or to the southward of the whole of the Maldivh islands.

FIRST OUTER PASSAGE is to eastward of Chagos group, and taken by vessels bound to the Bay of Bengal if they expect to pass the equator from April to September, with a *certainty* of gaining their port before the S.W. monsoon is over. It is also the best passage for ships bound to Gulf of Manár and any port along the west coast of Hindostan, when the N.E. monsoon is fairly established before they cross the equator.

On leaving the Cape of Good Hope, steer to the southward and run down the easting on the parallel of 38° or 39° S., as far as the meridian of 62° E. From thence steer to the north-eastward so as to enter the southern limit of the S.E. trade (between latitude 26° and 28° S.) on the meridian of 80° to 83° E. In continuing the course to the northward, care should be taken to gain easting to counteract the effects of the westerly currents, and to be prepared for the wind veering to the northward; for in standing across this trade it often happens, particularly in March, April, and May, that it blows more from East and E.N.E. than from S.E.

If bound to the Gulf of Manár, stand to the northward across the S.E. trade, and keep a little to the westward of Point de Galle if desirous to make that port. If bound to Madras, the Coromandel coast should be made to the southward of the port to provide for the effects of the northerly current produced by the S.W. monsoon. If bound to Trincomalee, great care is requisite to avoid the Bassas reefs, as, in making allowance for the sweeping easterly current near the south side of Ceylon

during the S.W. monsoon, a vessel might come upon them unawares. Recent investigations* have shown that the current at this season does not generally run northward along the east coast of Ceylon, but that a southerly counter-current then exists under the lee of the island.

Vessels bound to Tuticorin, Malabar, Bombay, or Karáchi, crossing the line in December, January, and February, should do so in long. 85° East, so as to make the N.E. monsoon a fair wind for Cape Comorin, the course to which will thence be about N.W. by N. However, it is improper for ships bound to the Gulf of Manár to cross the equator so far east in the month of November, they should do so then in the meridian of their port of destination.

* Commander Heathcote, late Indian Navy, in "Nautical Magazine."

TABLE OF POSITIONS.*

Place.	Particular Spot.	Latitude.	Longitude, East.	Height in Feet.
	MALDIVH ISLANDS.			
		° ′ ″	° ′ ″	
Ad-du Atoll -	Gung, the S. island -	0 41 30 S.	73 6 0	
Hit-ta-du island - -	North point - -	0 35 0	73 1 30	
Me-du island - -	N.E. point - -	0 35 10	73 10 0	
Phúa Molóku - -	Centre of island -	0 17 30 S.	73 23 0	
Suadiva Atoll - -	South extreme -	0 11 40 N.	73 10 0	
Fe-ur-wári island -	S.E. extreme -	0 13 30	73 4 0	
Ghang island - -	Centre - -	0 17 0	73 22 0	
Kandu hu-lu-du island	South end - -	0 21 0	73 28 0	
Hun-da-du island -	Centre - -	0 27 0	72 56 0	
Mah-foo-ri island -	Centre - -	0 50 30	73 7 0	
Ma-mutah islets - -	North end - -	0 51 0	73 20 0	
Suadiva Atoll - -	North extreme -	0 55 0	73 14 0	
Adu-Máti Atoll - -	South extreme -	1 46 30	73 22 0	
Mhowah island - -	Centre - -	1 53 30	73 14 0	
Esdu island - -	N.E. end - -	2 7 0	73 35 0	
Collomandu Atoll -	S.W. extreme -	2 11 0	72 58 0	
Vai-man-du island -	Centre - -	2 11 0	73 5 0	
Karn-du-du island -	South end - -	2 19 0	72 55 0	
Phalah island - -	Centre - -	2 24 0	73 22 0	
Bdoro-ni island - -	North extreme -	2 34 0	73 6 0	
Nillan-du Atoll - -	Southernmost island	2 40 30	72 53 30	
Foori island - -	N.E. point - -	3 1 20	73 0 0	
Nillan-du island - -	South end - -	3 4 0	72 53 0	
Nillan-du Atoll - -	North extreme -	3 21 0	72 53 0	
Molúk Atoll - -	Southernmost island	2 45 40	73 24 0	
Molúk island - -	Centre - -	2 57 0	73 33 30	
Ry-mun-du islands -	North extreme -	3 6 0	73 37 0	
Wah-ter-oo reef - -	South extreme -	3 13 0	73 23 0	
Phá-li-du Atoll - -	Southernmost island	3 19 0	73 27 0	
Fa-ta-o island - -	East extreme -	3 27 30	73 45 0	
Phu-li-du island - -	Northern end -	3 41 0	73 24 0	
Ari Atoll - - -	South island -	3 30 0	72 50 0	
Ditto - - -	Northernmost reefs -	4 17 0	72 45 0	
Ross Atoll - - -	South island -	4 15 30	72 58 0	
To-du island - -	Centre - -	4 25 45	72 56 30	
South Máli Atoll -	South extreme -	3 48 30	73 24 0	
Fino-rah island - -	N.E. end - -	4 6 0	73 31 0	
Máli, or King's island -	Flagstaff, N. side -	4 10 15	73 29 30	
North Máli Atoll -	East island - -	4 27 0	73 42 0	

* The longitudes of places on the continent of Hindostan are from the Grand Trigonometrical Survey of India, and depend upon Bombay Observatory being 72° 48′ 8″ East of Greenwich; those of the islands are measurements from the same meridian.

Place.	Particular Spot.	Latitude, North.	Longitude, East.	Height in Feet.
MALDIVH ISLANDS——*cont.*				
		° ′ ″	° ′ ″	
Gáfor reef	North extreme	4 47 0	73 23 0	
Cardiva island	Centre	4 58 15	73 26 0	
Horsburgh Atoll	West extreme	4 52 0	72 48 0	
Mahlos Mahdu Atoll	South extreme	5 1 0	72 50 0	
Powell's islands	North end	5 59 0	72 54 0	
Phaidi-Pholo Atoll	Southernmost island	5 15 0	73 29 0	
Milla-du Mádu Atoll	South extreme	5 39 30	73 17 0	
Malcolm Atoll	South extreme	6 12 0	72 38 0	
Mah-kundu island	N.E. extreme	6 25 0	72 41 0	
Tilla-du Máti Atoll	Keelah island, N. end	6 59 0	73 12 0	
Heawandu Pholo Atoll	South extreme	6 55 0	72 55 0	
Turacoon, the N. island of Maldivhs.	North extreme	7 6 20	72 53 0	
LAKADIVH ISLANDS.				
Minikoi island	Centre	8 17 0	73 3 0	
Seuheli-par	The south island	10 0 0	72 12 0	
Kalpéni island	South end	10 3 0	73 35 0	
Underoo island	East end	10 47 0	73 42 0	
Elicalpéni bank	Centre	11 13 0	73 57 0	
Cabrúti island	Centre	10 31 0	72 36 0	
Aucutta islands	S.W. islet	10 49 0	72 9 0	
Peremul-par	Sand-bank at N.E. point.	11 9 0	71 59 0	
Améni	Centre of island	11 5 0	72 41 0	
Kiltan island	North end	11 29 30	72 59 0	
Chitlac	South end	11 40 45	72 42 0	
Betra-par	Northern island	11 35 0	72 9 0	
Byramgore reef	S.E. point	11 48 0	71 50 0	
Cherbaniáni reef	South end	12 16 30	71 52 30	
CEYLON ISLAND, WEST COAST.				
Point-de-Galle	Lighthouse	6 1 25	80 12 32	100
Waal islet	Centre	6 7 50	80 5 20	
Akorále point	S.W. extreme	6 11 30	80 3 30	
Myimba rocks	-	6 16 0	80 1 0	
Haycock mountain	Summit	6 20 0	80 17 30	2,000
Oodapitta point	-	6 25 0	79 59 0	
Barberyn island	Centre	6 27 45	79 57 30	
Caltura fort	-	6 35 0	79 56 45	
Pantura rocks	Outer rock	6 42 0	79 53 0	
Mount Lavinia	-	6 49 45	79 51 15	
Adam's peak	Highest mountain	6 49 0	80 29 0	7,420
Colombo flagstaff	-	6 56 0	79 50 0	
Negomba point	N.W. extreme	7 12 0	79 48 0	
Chilaw	Bungalow	7 34 0	79 48 0	
Calpentyn island	Talavilly, the N.W. point.	8 12 0	79 41 0	
Dutch bay	N. point of Long island.	8 19 0	79 45 0	
Kara-tivo island	North extreme	8 31 0	79 46 30	

Place.	Particular Spot.	Latitude, North.	Longitude, East.	Height in Feet.
	GULF OF MANÁR.	° ′ ″	° ′ ″	
Kodra-malai point	West extreme	8 32 0	79 51 0	
Condáchi village	At bottom of bight	8 42 30	79 56 30	
Doric house	-	8 46 30	79 55 30	
Manár island	Westernmost point	9 6 0	79 41 0	
Ramiseram island	The great temple	9 18 7	79 17 50	120
Paumben lighthouse	One mile E. of pass	9 17 30	79 12 34	
Tonitorai point	The temple	9 17 0	79 10 0	
Manauli islet	Centre	9 13 0	79 7 0	
Anapar-tivo islet	Centre	9 9 10	78 41 0	
Valinúkam point	East extreme	9 9 30	78 39 0	
Tuticorin light	Obelisk on Hare island	8 47 17	78 11 10	43
Manápaud point	White church on summit.	8 22 40	78 3 0	100
	WEST COAST OF HINDOSTAN.			
Cape Comorin	British residency	8 5 0	77 31 0	
Conical mount	S. sugar-loaf hill	8 8 0	77 28 30	1,403
Crocodile rock	3 miles off shore	8 6 0	77 16 0	
Enciam islet	Centre	8 12 30	77 9 0	
Trivandrum	Observatory at 2 miles N. of the town.	8 30 35	76 56 45	196
Anjengo	The flagstaff	8 40 0	76 46 0	
Quilon point	Tangachéri flagstaff	8 53 30	76 35 0	
Alipee	Lighthouse on beach	9 30 0	76 20 0	100
Cochin	Flagstaff and light	9 58 0	76 14 0	
Ponány river	The entrance	10 47 0	75 56 0	
Calicut	Lighthouse on beach	11 15 10	75 46 0	
Camel's hump	Summit of mountain	11 26 0	76 8 0	7,000
Cotta point	Outer trees	11 28 0	75 37 30	
Sacrifice rock	-	11 29 30	75 31 30	
Mahé flagstaff	On S. point of river	11 42 0	75 31 0	
Tellicherry fort	Light on flagstaff	11 45 0	75 29 0	
Cannanore fort	Light on flagstaff	11 51 10	75 22 5	110
Mount Dilly	Highest part	12 1 45	75 12 0	850
Beykul fort	Highest tower	12 23 33	75 2 0	130
Mangalore	Lighthouse on hill	12 52 0	74 50 0	250
Mount Hyder	Summit of mountain	13 8 0	75 16 0	6,100
Molky rocks	4 miles off shore	13 12 0	74 40 0	
Déria Bahádur Ghur	Highest part of island	13 20 20	74 41 0	70
Cundapur river	N. point of entrance	13 37 30	74 41 0	
Colúr Guda, or False Barsilore peak.	Sugar-loaf peak	13 52 0	74 52 0	4,400
Hog island	Summit	14 0 26	74 28 0	300
Pigeon island	Centre	14 1 20	74 19 0	300
Fortified island	Centre	14 18 30	74 24 0	
Cumta lighthouse	-	14 25 20	74 23 0	180
Tudri river	Summit of Kúdinigúda.	14 31 10	74 19 0	480
Anjídéva island	High North part	14 45 30	74 6 0	
Carwar, or Sedashigar	Oyster rocks lighthouse.	14 49 0	74 3 0	160
Cape Ramas	Fort flagstaff	15 5 12	73 54 10	220

Place.	Particular Spot.	Latitude, North.	Longitude, East.	Height in Feet.
WEST COAST OF HINDOSTAN—*cont.*				
		° ′ ″	° ′ ″	
St. George's islands	West summit	15 21 5	73 45 0	250
Goa harbour	Agoáda lighthouse	15 29 25	73 45 30	280
Vingorla point	Beacon on hill	15 51 10	73 36 20	250
Vingorla rocks	S.W. rock	15 53 0	73 27 20	
Melundi fort	Centre	16 2 20	73 27 20	
Deoghur fort	N.W. bastion	16 23 24	73 21 30	
Viziadroog fort	Flagstaff in centre	16 33 30	73 19 0	
Ratnaghiri fort	S.W. bastion	16 59 30	73 16 0	300
Jyghur point	Temple at N.W. brow	17 18 0	73 11 0	120
Boria point	Temple on summit	17 24 0	73 9 30	360
Anjenwil point	Tolkeshwur temple	17 33 30	73 8 0	300
Severndroog fort	Centre of island	17 49 0	73 6 0	
Bankot river	Fort Victoria	17 58 0	73 2 0	
Rajpúri harbour	Jinjira island	18 18 0	72 57 0	
Choul harbour	Kurla fort	18 32 0	72 54 0	
Kundári island, or Kenery	Highest S. part	18 42 20	72 48 0	120
Bombay harbour	Colába lighthouse	18 53 42	72 48 0	132
Basseen river	Pos-Pir rock	19 20 0	72 45 30	
Arnol island	Centre	19 27 30	72 43 0	
Tarapur point	West extreme	19 50 0	72 38 0	
Valentine's peak	Summit	19 56 0	72 54 0	1,540
Dánu fort	- - -	19 58 0	72 42 0	
Damáon river	Fort Jeronimo	20 24 30	72 49 0	
Surat river	Tapti light by Vaux's tomb.	21 5 20	72 38 0	80
Dandi, or Bogwa light	On a low point	21 19 40	72 35 30	
Perim island	Lighthouse	21 35 0	72 20 0	86
Goapnáth point	The pagoda	21 12 0	72. 7 0	150
Shalbet island	- - -	20 54 0	71 32 0	
Diu head	Building on summit	20 41 0	70 51 0	104
Veráwal	S. bastion of fort	20 53 30	70 23 0	
Porbunder fort	S.W. bastion	21 37 0	69 35 30	
Dwarka temple	- - -	22 14 0	68 58 0	168
Bćka shoal	Sand, dry at L.W.	22 33 0	69 1 0	
Lushington shoal	3½ fathoms patch	22 37 40	68 48 0	
Sainia island	Highest part	22 28 50	69 4 20	
Chánka island	Centre	22 31 30	69 23 0	
Nowa Nugga fort	The Kota, high tower	22 27 15	70 8 0	182
Júria fort	N.W. bastion	22 41 15	70 16 30	
Toona creek	Tekra island	22 56 30	70 7 0	
Nowanár point	East extreme	22 44 15	69 42 0	
Kutch Mandavee	Lighthouse	22 49 40	69 20 0	88
Nunnow hill	22 miles inland	23 11 30	69 20 0	1,280
Assur pagoda	- - -	22 51 0	69 13 0	118
Jakáo creek	Mound on N. side	23 16 0	68 34 15	
Lukput river	Outside the bar	23 27 0	68 13 0	
Indus river	Kediwári beacon	24 6 0	67 23 0	
Karáchi	Manóra lighthouse	24 47 20	66 58 15	120
Cape Monze	S.W. point	24 50 0	66 39 0	

INDEX.

	Page
Abusàlia rock	179
Achira river	114
Adam's bridge	58
——— peak	35, 51
Adonis, schooner	245, 262
Ad-du atoll	250, 292
Adumdah island	75
Adu-Máti atoll	258
Agalega island	300
Agoáda	107
Ahungalle point	47
Aibika river	78
Ajár island	221
Akorále point	46
Aku pir	211
Alendál shoals	68
Alipee	72, 79
Alibagh	125
Aligow island	277
Allah band	199
Alut rock	47
Alwye	81
Amblangodde	46, 296
Ambolghúr reef	117
Amber cape	299
Améni	285
Ami shoal	106
Amli creek	172
Amwah bay	120
Anapar Tivo	61
Anamullay mountains	83, 86
Anderan rocks	48
Andri fort	190
Andái islands	237
Angasi bay	148
Angria bank	5, 116
Anjengo peak	76
——— roads	77
Anjidíva island	99
Anjenwíl river	121
Anjar	207
Ankóla	98
Anne, ship	283
Arámra fort	195
Arive-ar	36, 58
Aripo	58
Ari-ad-du channel	268
——— island	269
Ari atoll	268, 269
Arnol island	148
Ass's ears	91
Assar pagóda	200
As-du island	274
Atalanta brig	299
Aucutta island	286
Aurigi cape	99
Back bay	130
Bachawára	184
Bahádur Ghur	93
Bainsla islet	181
Bálachéri	211
Balapitti	47
Balda Pardi	153
Balgotti island	80
Balsár river	153
Bankot	122
Bándra	145
Baobab trees	58
Báoliári	172
Báonugga	172
Barberyn island	49
Barn hill	91
Barkúr	94
Barsilore peak	94
Baswarajah Droog	96
Bassein river	146
Bassas de Pedro bank	289
Batkul Droog	95
Baticólo	95

	Page
Bate island	193, 219
—— harbour	197, 220
Bayday	212
B'doroni	262
Beach hill	49
Bednore	94
Beerwála	195
Beitkul cove	100
Béka shoal	196
Bellows rock	39
Belikéri	98
Beliapáni reef	288
Bentotte river	36, 48
Bétul	105
Betra Pár island	287
Beypore	83
Beykul	90
Bhadar river	191
Bhooj	200
Bibi Ajáni tomb	154
Bida island	218
Bilicullor	86
Billiapatam	88
Binghi bay	99
Bingaro island	286
Birda hills	186, 191
Black rock	102
—— bluff	223
Bogwa sands	160
Bomgúda	102
Bombay, approach	126
—— harbour	128–143
Bori mountain	109
Búria point	121
Bore tide	168
—— rocks	172
Bora-ka-thul	210
Boscawen passage	300
Breaker bank	158
Brinjall hill	77
Broach point	160
—— town	160
Brothers islets	221
Brunswick shoal	299
Búa creek	234
Búbasir rock	216
Búdresir temple	206
Buffalo island	101
—— rock	106
Bunder	120
Bunni	200
Burnt island	113
Burtu creek	192
Burál reef	217
Button rock	99
Butchers island	130
Byndúr head	95
Byramgore reef	288
Byramgore, ship	288
Cab de Ráma	104
Cábo reef	107
Cabruti island	284
Cadiapatam point	75
Cahp rocks	93
Calcutta	246
Calicut	84
Caltura	49
Calpentyn	55
Calpúti island	286
Camels hump	85
Camberi rock	106
Cambay gulf	23, 144
—— town	163
Cania Cúmari	70
Cannanore	88
Cánara coast	90
Cánacon	104
Cape St. Mary	291
Cardiva tides	275
—— channel	273, 275
—— island	56, 274, 275
Caranjá island	130
—— shoal	137
Cardamum island	285
Carwar head	99
—— port	100
Causergode	91
Cawda Guda	99
Ceylon	4
Chagos archipelago	292
—— currents	295
—— islands	291
Chálium	84
Chánch town	179
Chandernát	105
Chanderi peak	137
Chánka island	216
Chanks	38, 193
Chankudhúr	193
Chápra	110
Chára tomb	188

	Page
Chendaghíri	91
Cherbaniáni reef	288
Chereapáni reef	288
Chéria islet	283
Chichun	149
Chilaw	54
Chilnú island	243
Chinna creek	238
Chinri reef	219
Chitlac island	287
Chittagong	246
Chitwye	83
Chowghát	80, 83
Choul	124
Choul kádu reef	125
Chorwar	189
Chora sand hills	195
Chully-tivo	63
Chúsra island	218
Churna island	243
Cleopatra's cyclone	11, 294
Climate	26
Cocacheira	47
Cochin	80
Códinjau Col	91
Codáchi parwut	94
Coilnapatam	67
Coilsinipatam	68
Col bay	105
Colába	129
Coláchul	75
Colatúr hill	76
Colla	105
Collomandu atoll	260, 262
Colombo	50, 281
Colungode bluff	80
Colúr guda	94
Competitor, ship	288
Comorin cape	70, 73, 275
Comoró islands	298
Comra bay	123
Conda bank	48
Condáchi	57
Contractor, ship	295
Coonducam point	59
Coorisuddy	60
Coote, reef	84
Coorg	90
Cora-divh	289
Coruti island	284
Coryan's tomb	159
Cosumba	153
Cota guda	96
Cotta point	86
Coura-mat-ti island	270
Cóvilum	76
Cranganore	82
Crocodile rock	75
Cross island	130
Cuchy Mulla	73
Cumla	91
Cumta	96
Cunjár Guda	93
Cundapur	94
Currents	6, 52, 294
Curmaghur	101
Cutgál	97
Cyclones	12
Cyclops, H.M.S.	299
Dábhol	121
Dáliwála	182
Damáon	151
Dándi light	159
Dánu	150
Daumlej	188
De-ah-du	255
Deah-me gelli	261
Debaha rock	46
Dedru-oya	36, 54
Dedj	160
Dedjbára shoal	161
De-lu-foori island	265
Deoghur island	101
——— harbour	115
Deojugan light	162
Déra	214
Derávi island	146
Derdiwi island	130
Déria Bahádur	93
Desaster	50
Devils point	64
Devam-poori island	274
Dhig-gheri	268
Dhig-hurrah island	269
Dhólera	172
Dhráwa	193
D'huwáo	212
D'húni	216
Dhur-an-du island	276
Digorelia	50
Digghur-ru island	266

	Page
Dilly mount	89
Direction bank	125
Diu	30
—— harbour	182
—— head	184, 187
Dodabetta	20
Dodandowe	45
Dodompara rocks	48
Dolphins head	83, 86
———— reef	136
Domus	156
Doo-rais island	263
Doric house	57
Dorah-kandu	276
Doupe	229
Drunken sailor	51
Dubba river	234
Dumkhul bay	120
Durmapatam	87
Dutch bay	55
Dwarka	194
East cape	70, 172
Edwards pillar	39
Eight degrees channel	281
Elephant island	99
Elephanta island	130
Elicalpéni bank	5, 90, 284
Enciam islet	75
Engúrla	112
Equatorial channel	253
———— current	295
Esdu island	259
Európa island	298
Fainu island	277
Fa-ta-o	268
Feri-du island	269
Fe-ur-wári	254
Fhen-du island	276
Fifty fathoms flat	126
Fino-rah	270
First outer passage	301
Fogs	27, 223
Fooree	261
Foori island	263
Formosa mount	90
Fortified island	96
Freshwater island	61, 63
Funnel hill	130
Gadùra	178
Gáfor reef	273
—— island	273
Gah-du	259
Galbode Kande	48
Galega island	300
Gales	10
Galle	35, 39
Galle-ho-galle	44
Gamatacan island	280
Garapóri island	130
Gaspar Dias	107, 109
General Simpson, ship	296
George, St., islands	105
George island	299
Geráva island	273
Ghang	255
Gibbet island	130
Gindura	36, 44
Gindavána islet	46
Girh hills	185
Girnár mountains	186, 192
Gisri creek	235
Goa harbour	107
—— light	288
Goapnáth point	177
Godda bank	45
Godhully peak	100
Gogah	173
Goglah	183
Goidu island	275
Gokurn	97
Gona rocks	45
Gongwa	162
Good Hope, Cape of	297
Goomti creek	194
Goos reef	215
Gooria creek	228
Góriáli	176
Górabee creek	234
Gósa	191
Grantham, ship	287
Green island	87
Guddu	255
Gulandu channel	279
Gull island	130
Gulúr point	150
Gúlwala bank	159
Gungawéli	98
Gundavi river	154
Gundar	162

	Page
Gundiári	206
Gung island	250
Gunjáo Kudda bank	222
Gurpur	92
Gurúr shoal	196
Gu-rah-du	261
Gúzerát	144
Haim-bud-du island	273
Haintul creek	208
Hajámri	233
Halár coast	210
Hanstul creek	208
Harispol point	47
Hare island	64
Harissa hill	122
Haycock hill	45, 47, 48
Hea-wandu-pholo atoll	280
Heeran river	189
Heerakót	189
He-lan-du island	260
Helen-geli island	274
He-men-du island	269
He-nadu-adu	259
Henery island	125
Herni	122
Hersad máta	192
He-tah-du island	276
Hiccode rock	45
Hickadowe	46
Him-bu-du island	271
Him-it-ti island	264
Hit-ta-du	250
Hog island	95, 137
Holi hill	117
Honore	96
Hoo-waili Foori island	274
Horsburgh atoll	273, 275
Hoss droog	90
Huahdu	253
Hubshi	123
Huddi point	95
Hu-lu-du	250
Hu-lu-dáli island	263
Hummocks	49, 50
Hun-da-du	254, 258
Hun-man-dánda	219
Hurchiri hill	118
Hyder mount	92
Idingikári	70
Indaghúr hill	151
Indian ocean	290
Indus river	3
Islet point	178
Iviker river	78
Jafrabad	180
Jakáo creek	228
Jáli Kund	95
Janmeer	177
Jeerpra	205
Jégri bluff	178
Jeronimo, St.	152
Jhiri creek	234
Jigat temple	194, 226
Jigi point	178
Jinjira island	123
Joáo da Nova	298
Jog river	122
Juá creek	234
Juggat	194, 226
Jumbaseer road	161
Júnaghúr	186, 192
Júria fort	210
Jygi point	115
Jyghur point	120
Kadru creek	234
Kaghay island	271, 273
Kahá river	232
Kái creek	234
Kaira	179
Kain-de-co-lu island	278
Kala-oya	36
Kalani-ganga	36, 53
Kal-ár	57
Kalapúra	148
Kalbadévi bay	119
Káldrug	149
Káli Nadi	100
Kalpéni	283
Kálu-ganga	36, 49
Kambála hill	133
Kambália	216
Kamundroog	147
Kánsi island	123
Kan-da-du	257
Kandu-foori	262
Kan-dim-bah island	263
Kandu-hu-lu-du	255
Kan-he-me-du	261

	Page
Karáchi	30, 236
Kara-tivo	56
Karil rock	113
Karli river	113
Karn-du-du	260
Karteshwur temple	120
Karúmba	215
Kásoa islet	130
Katiawár coast	23
——— peninsula	167
——— W. coast	186
Kauli creek	151
Kaumba river	189
Kéamári	237
Kédiwári	232
Keelakári	62
Keelah island	279
Keelcaud point	63
Kémel	36, 54
Kénery island	125
Kerevanne rock	48
Kéri Kubba péak	203, 227
Keyim	124
Kilwah Méhim	148
Kiltan island	287
Kim-be-du	261
Kings island	271
Kiu hills	220
Knuckles	49, 50
Kodra Malai	56
Kodungalore	82
Kodyal Bandar	91
Koilon	77
Koilundy	86
Kolába island	125
Kolahcoon hill	84
Kolinár	188
Konay	100
Konkan coast	111, 144
Koodah-Huá-du channel	262, 265
Koon Bunder	172
Koora islet	114
Kootrah	178
Kori river	228
—— bank	231
Kosgodde hill	47
Kotah island	75
Krangi-tivo	64
Ku-ber-du	256
Kuddelur	86
Kúdi creek	235
Kudri Mukh	92
Kukra island	98
Kukiwári	232
Kumbay rock	102
Kumbáru point	123
Kunáli rock	86
Kúndah mountains	85
Kundári island	125
Kúndi Kári	154
Kunday	255
Kundlo creek	208
Ku-man-du	259
Kúra point	174
Kurla fort	125
Kurnáli hill	130
Kutch gulf	199
Kutch, W. coast	226
Kutchigud	195
Kutpoor	178
Lahára point	160
Lakadivh islands	282, 287
Land breezes	13, 66
Lavinia mount	50
Little Padua bank	289
Loliem point	102
Long island	55
Lukput river	228
Lushington shoal	196
Madagascar	291, 299
Mad-a-velly	258
Mad-du-weri island	266
Madhully hill	101
Mádura coast	36, 60
Mádupore	191
Magoona point	49
Mahableshwur	111
Mahádeopore	191
Mah-a-du	256
Mahaluxmi peak	149
Maha-oya	36
Mah-ba-du	259
Mah-foo-ree	256
Mah-men-du	256
Mah-mutah	256
Mahé	87
Mah-ma-gelly island	269
Mah-lus island	269
Mahlos Mahdu atoll	276
Mah-Kundu island	279

	Page
Maitlah point	177
Makúnamulla	77
Mákrah bank	161
Mál bank	163
Malabar coast	82, 281
——— hill	130
——— point	145
Malacca, or Malaiki banks	152, 158
Máli atoll	271
—— island	245, 271
—— —— winds	292
Malcolm channel	163
——— atoll	279
Malikoi island	281
Maldivh islands	244
Malwan	114
Man-ah-du island	278
Manápaud point	68
—— —— shoals	69
Manár island	58
—— gulf	20, 35, 301
Manauli	60, 62
Manda islet	45
Mandar	189
Mandavee	201
Man-du island	269
Mandwa point	184, 187
Mangalore	91
Mangaról	190
Manóra point	236
Mantotte	58
Mára-du	252
Ma-ra-rah	255
Mar-dáli	263
Margao river	105
Marmagao	106
Marriotts rock	102
Marúli creek	151
Marúvatúr	73, 74
Marys Saint, isles	93
Matowra	176
Má-tura	254
Máti-wári island	269
Mauritius	292
Mazagon	130
Medda islet	45
Me-du	250
Mefaingfoori island	274
Méhim bay	145
Melundi fort	114
Merjee	97
Meria Donghur	119
Métivéli	175
Mhar river	122
Mhowah	258
M'hul Dwarka	188
Miandraghiri	73, 74
Miáni Bunder	192
Middle ground shoal	136
Middle passage	300
Milla du Madu atoll	278
Minikoi island	281
——— currents	295
Mirján	97
Mír Tamásha	201
Moderegam	36, 57
Modere-galle point	48
Modeshwur	96
Modwah point	204
Mohúmdi bank	174
Molee islands	266
Molky river	92
—— rocks	93
Moliem point	104
Molúk atoll	262, 265
—— town	265, 266
Mombri bay	115
Monakbára	184
Monsoons	14
Monze, cape	242
Moolee islet	61
Mooram-shulli-tivo	66
Moondra	206
Moonia-foori	259
Morchund	175
Moresby channel	276
Mount Lavinia	50
Mount Dilly	89
Mount Hyder	92
Mowah	178
Mozambique channel	291, 297
Muári, Ras	243
Muchkundi river	117
Mud bay	79
Mudhi	192
Mull river	232
Mulpy	94
Munjeshwur	91
Munki Droog	96
Mungra reef	210
Munnerah hill	228
Munnejah bank	232

	Page
Munyal-pár	289
Mura-du island	280
Murex reef	181
Murri	192
Murwah	146
Muta Amarata Boka	47
Mutwal	36, 52
Myhé river	3, 163
Myimba rocks	47
Nagwah	184
Nah-fori island	277
Naimun hill	77
Nájimundel	62
Nandivéli mountains	180
Nanáo hill	203
Napa rock	48
Navibunder	191
Navinár point	205
Nawoelle-kande rock	49
Nawinár point	205
Neats Tongue	131
Negomba	54
Neori point	119
Nerbuddah river	3, 160
——— bank	158
Netrun island	95
Nikól	178
Nil-an-du	256
Nilghiri mountains	1, 85
Nillan-du atoll	262
——— island	264
Nimanár hill	86
Nine degrees channel	282
North-east monsoon	14
North Máli atoll	271
North Mahlos Mahdu	277
Noru island	218
Nosári river	154
Nossa Senhora da Cabo	107
Nowa Bunder	182
Nowa Nugga	212
Nuggur	94
Nukti creek	207
Nulla-tani-tivo	63
Nunda-áli	254
Nunnomár hill	203, 227
Núrira	215
Nuti point	118
N'wára shoal	201
Nya-Kandugalle	48
Okani-fouri islet	273
Okha-mundel	193
——— Nadi	194
——— point	195
Oku-lus islet	269
Omergám	150
Omersári	153
Omrah	156
One-and-a-half-degree channel	258
Oodapitta	48
Ooluwitti	54
Oonawatty point	38
Oopu-tani-tivo	63
Oorutmulla	84, 86
Ootaunkúdi	70
Ooticamund	25
Oráva rock	45
Outaree bank	48
Oyster rocks	101
——— rock	129
——— islands	237
Padua bank	5
Pága reef	219
Paidegal point	104
Palinurus, E. I. C. brig	296
Paliport	72, 82
Palghát	1, 80
Palshet bay	122
Panjim	107
Pantura	50
Páos bay	118
Paps	129
Parell	131
Paringé-torai	56
Par-nadi	153
Parnéra hill	153
Passages	28, 297
Passee rock	46
Patiagalle point	47
Paumben pass	59
Pau-pir	131
Paulatána	176
Pearl banks	38, 57, 66
Penacoil	66
Pent	117
Periathully	69
Perigee rock	173
Perim island	174
Péritan	213
Peremul par reef	286

	Page
Phalah	261
Pha-li-du atoll	266, 267
Phaidi pholo atoll	277
Phoolah Moloque	250
Phúa Molóku	252
Phu-li-du island	267
——— channel	268, 270
Pigeon island	95
Pindára	222
Pir Bálu hill	122
Pitiáni creek	234
Piti creek	235
— bank	285
Point-de-Galle	35, 39
Polem	102
Ponány	83
Pondera	76
Pootoray	76
Póranghur	117
Porbunder	191
Porca	79
Pos Pir rock	147
Poshetra	220
Powells islands	277
Premier, barque	284
Primeira rocks	93
Prongs reefs	134
Pullee	60
Purcaud	79
Pussodi Gumpa	91
Putlam lake	55
Putnurmadúr	63
Puttun	189
Pyramid hill	151
Quilon	77
Quilundy	86
Quoin hill	222
Ragamma point	46
Ráhu creek	204
Rainfall	25
Rajahmundroog	97
Rájapur bay	117
Rajpúri harbour	123
Rajpúr	181
Ra-khi-du island	267
Ramas, cape	104
Ramdhurna	129
Ramiseram	59
Ranwára shoal	201
Ratnaghêri	118
Rawul Pir	204
Réis Mágos	107
Réri rock	111
Rewadunda fort	125
Rhuk bank	173
Ribanda	108
Richel creek	234
Rivers	3, 36
Rohar	207
Roinsia	181
Roji	212
Rola hill	154
Ross atoll	269
Rose Galley rock	299
Runn	209
Rúpon Bunder	194
Rus-du island	270
Ruttera	76
Ry-mun-du island	266
Sabermati river	3, 172
Sacrifice rock	86
Sail rock	105
Saint Marys isles	93
Saint Mary cape	291
Saint Georges islands	105
Saint Johns highland	149
Saint Jeronimo	152
Sainia island	196
Salset river	105
Salsette	145
Saltwater island	63
Samarang, ship	299
Sanganians	195
Saraswáti river	189
Sátputti Kári	148
Savitri river	122
Sea breezes	13, 66
Searbet island	179
Secretario island	106
Sedashigar	100
Seel Bunder	190
Seeka Kári	215
Seer river	230
Semah fort	181
Sénegamme point	46
Seóri islet	223
Seraia bunder	216
Séria Ka Manda	99

	Page
Sesostris bank	289
Sesostris, steamer	289
Seuheli pár	282
Severndroog	122
Sewree fort	131
Seychelles islands	291
——— currents	295
Shalbet island	179
Shastri river	120
Shingle islets	60
Silavatorre	57
Sindh coast	23, 229
Sin-du-droog	114
Singoteer Máta	164
Singóra	188
Sirjakot	114
Sirigom	148
Sisipára	82
Slope hill	151
Snail rock	97
Sómad	188
Somnáth temple	189
Sonár durri shoal	205
Sónchia	176
Soondri	172
Soundings	5, 32, 37, 74, 78
South-west monsoon	17
South Máli atoll	270
South Mahlos Mahdu	276
Square rock	114
Srewerdun bay	123
Suadiva	253
Suáli hills	159
Sultanpore	176
Sumátra	248
Sunchi shoal	106
Sunghiri	101
Sunján	149
Surat	155
Surat, ship	257
Suri fort	131
Surmut Kári	214
Surutkul	92
Sutrinji river	176
Sutrapára	188
Swally roads	159
Swatch-of-no-ground	231
Table of positions	303
Taliári islet	62
Talpon river	104
Tamásha tomb	201
Tambapáni river	37
Tangachéri reef	78
Tankária	161
Tanore	83
Tanote Mullay	86
Tannah peak	145
——— creek	159
Tapti river	3
—— light	156
Taptee, brig	285, 293
Tarapur point	149
Tekra	207
Tellicherry	87
Te-mar-rah	261
Thani Kodi	59
Thull knob	129
—— shoal	132
Ticottay	86
Tides	8
Tiger hill	112
Tilla-du-máti atoll	279
Tinavelly coast	37
Tin-a-du	257, 268
Tingaro island	286
Tiracol river	110
Tithul	154
To-du island	270, 273
Tolkeshwur pagoda	121
Tonitorai	60
Too-ah island	266
Toona Bunder	207
Toolis-du	274
Travancore coast	72
Trade drift, current	294
Trades, S.E.	300
Trichendore	67
Trivandrum	76
Tromba	131
Tudri river	97
Tullijah hill	176
Tulsunda cove	117
Tung rock	46
Tunkra temple	191
Tuticorin	61, 64
Uchil Guda	93
Unapayagalle point	48
Unári island	125
Underoo	283
Unkóla	98

	Page
Unnia Mor shoal	196
Ussapur rock	148
Vaimbaur	63
Vai-man-du channel	250, 260
Vaivand island	266
Valinukam	63
Valentines peak	149
Variation, compass	27, 296
Vatang rock	46
Vaturna river	148
Vauxs tomb	155
Veervanjan temple	189
Veerwára	195
Veláwal	189
Veluki-ár	36
Vélum	184
Veniam point	76
Veráwal, or Verrole	189
Versovah	146
Victoria fort	122
Vicissitude, ship	245, 280
Vingorla town	112
——— rocks	113
Viziadroog	115
Vománi point	195
Vudda Kudda reefs	222
Vurtu creek	192
Vygah river	36
Vypár river	37, 63
Waal islet	46
Wachu	194
Wadge bank	74
Wagótun	116
Wágnugga	178
Wah-du	254
Wah-ter-oo channel	266
——— reef	266
Walkeshwur	145
Wali-gandu	262
War-du channel	271, 273
——— island	271, 273
Wári river	232
Warári	119
Wavutmullay	85
Weather	21, 24
Weli-gan-du	270
Whale rocks	44
——— reef	123
Wilin-gili	250
Willee-gillee	256
Willi-foori	261
Winds	9, 223
Wuddakurray	87
Wudwan point	149
Wujirgurh	148
Yelgetty Guda	94
Yetia	117

LONDON:
Printed by GEORGE E. EYRE and WILLIAM SPOTTISWOODE.
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.

[13844.—750.—2/66.]

00104823

Digitized with financial assistance from the
Government of Maharashtra
on 05 October, 2018